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VOLUME IVB
SELF-TENSIONING ACOUSTICAL
HORIZONTAL LINE ARRAY
(SPRAY)
DATA ANALYSIS (U)

FINAL REPORT OF BEARING STAKE TESTS
JANUARY THRU MARCH 1976

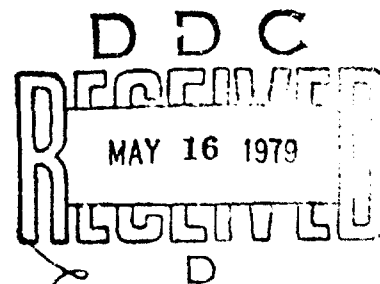
9 JANUARY 1979

PREPARED FOR
NAVAL AIR DEVELOPMENT CENTER
WARMINSTER, PENNSYLVANIA

UNDER CONTRACTS
N62269-77-C-0139
and
N62269-78-M-6884



PREPARED BY
SANDERS ASSOCIATES, INC.
OCEAN SYSTEMS DIVISION
95 CANAL STREET
NASHUA, NEW HAMPSHIRE 03061



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2

LEVEL III

VOLUME IVB

SELF-TENSIONING ACOUSTICAL
HORIZONTAL LINE ARRAY
(SPRAY)
DATA ANALYSIS.

FINAL REPORT OF BEARING STAKE TESTS

JANUARY THRU MARCH 1977.

Volume IVB, Data Points 10, 11
and 12 Raw Data

9 JANUARY 1979

120 515p.

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NAVAL AIR DEVELOPMENT CENTER
WARMINSTER, PENNSYLVANIA 18974

UNDER CONTRACTS

N62269-77-C-01395

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NATIONAL SECURITY INFORMATION
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By

R. L. Townsend
R. L. Townsend

391290
18 Jan 1979
Date

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CLASSIFIED BY DD254 1 Dec 7
N62269-77-C-0139
Exempt from GDS of EO 11652
Exemption Category 3
Declassify on 31 Dec 1989

SAI DOCUMENT CONTROL #
1-10-580-8

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VOLUME

IA	Summary - Test Results
IB	Detailed Description, Test Results
II	Data Analysis Facility and Data Reduction Methodology
IIIA	Data Points 1, 2 and 3 Raw Data
IIIB	Data Points 4, 5 and 6 Raw Data
IVA	Data Points 7, 8 and 9 Raw Data
IVB	Data Points 10, 11 and 12 Raw Data

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 FRAZ Recording
 Signal Level and SNR Calculations
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 Beamformed ALIU Plots

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- 8.0 Data Point 11 3-16-77 0935Z (32 Element Beamformed Data)
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 - Signal Gain and Array Gain Calculations
 - Beamformed ALIU Plots
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 - Signal Level and SNR Calculations
 - Signal Gain and Array Gain Calculations
 - Beamformer ALIU Plots

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NOTE ALI Plot Scales for Beamformed and

Omni Data are NOT the same.

SNR comparisons cannot be taken directly
from plot comparisons.

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• OMNI NOISE LEVELS

19 JANUARY 1977		DATA POINT 1
290 Hz	+64.6	dBrepPa/1 Hz
295 Hz	+64.2	dBrepPa/1 Hz

19 JANUARY 1977		DATA POINT 2
290 Hz	+64.7	dBrepPa/1 Hz
295 Hz	+65.4	dBrepPa/1 Hz

7 FEBRUARY 1977		DATA POINT 3
140 Hz	+74.5	dBrepPa/1 Hz
290 Hz	+67.5	dBrepPa/1 Hz

7 FEBRUARY 1977		DATA POINT 4
140 Hz	+73.3	dBrepPa/1 Hz
290 Hz	+65.6	dBrepPa/1 Hz

7 FEBRUARY 1977		DATA POINT 5
140 Hz	+76.6	dBrepPa/1 Hz
290 Hz	+68.4	dBrepPa/1 Hz

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7 FEBRUARY 1977 DATA POINT 6

140 Hz +76.0 dBreμPa/1 Hz
290 Hz +68.9 dBreμPa/1 Hz

8 FEBRUARY 1977 DATA POINT 7

140 Hz +70.1 dBreμPa/1 Hz
290 Hz +62.2 dBreμPa/1 Hz

15 MARCH 1977 DATA POINT 8

140 Hz +67.3 dBreμPa/1 Hz
290 Hz +61.6 dBreμPa/1 Hz

15 MARCH 1977 DATA POINT 9

140 Hz +68.2 dBreμPa/1 Hz
290 Hz +65.2 dBreμPa/1 Hz

16 MARCH 1977 DATA POINT 10

140 Hz +74.2 dBreμPa/1 Hz
290 Hz +64.6 dBreμPa/1 Hz

16 MARCH 1977 DATA POINT 11

140 Hz +70.2 dBreμPa/1 Hz
290 Hz +62.2 dBreμPa/1 Hz

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● OMNI NOISE LEVELS

16 MARCH 1977

DATA POINT 12

140 Hz

+72.0

dBrepPa/1 Hz

290 Hz

+65.5

dBrepPa/1 Hz

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INM O

80-24
DAIR

**OPERATIONAL
DATA**

73237
760315
-245

75057
35104
125.

051807
NLDN
ZARD-

AD-
WADTH
BLVER-

AWAY
-15
TV

4/2
never
tion

SNR

LINEAR
PROCESS
ING

ONSET-
ED
SNR

DATE: 2-8-77 TIME: 0202Z
DRAUSE: 28 NM. 140 HZ
DEPTH: 1900 FM 290 HZ

DATE: 3-15-77 TIME: 1501Z
 RANGE: 22NM 140HZ
 DEPTH: 2800FM 290HZ

DATE: 3-4-77 TIME: 2131Z
 RANGE: 72 N.M 140 MZ
 DEPTH: 2000 FMS 280 MZ

DATE: 3-16-77 TIME: 0633Z
RAUFE: 128 AM 140 HZ
FREQU: 2305X 20042

DATE: 3-16-77 TIME: 0935Z
 RANGE: 132 N.M. 140 WZ

DATE: 3-16-77 TIME: 1148Z
ANSE: 1230M, 140M2

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LEADS

16

ELEMENT

ARRAY

[illegible]

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SECTION 2

NOISE SPECTRAL DENSITY CALCULATIONS FOR SPRAY/BEARING STAKE (U)

DATA POINT 10 DATE 3-6-77 TIME 0633Z

FREQUENCY 140 HZ

INDICATED NOISE LEVEL dBV 110
ABW

-46.0

SYSTEM SENSITIVITY dB/μB

-(-12) = -34.0

BANDWIDTH CONVERSION TO 1 HZ BAND

+8.2 = -25.8

CONVERSION TO dBreμPa/1HZ

+100 = +74.2

NOISE SPECTRAL DENSITY CALCULATIONS FOR SPRAY/BEARING STAKE (U)

DATA POINT 10 DATE 3-16-77 TIME 0633Z

FREQUENCY 290 HZ

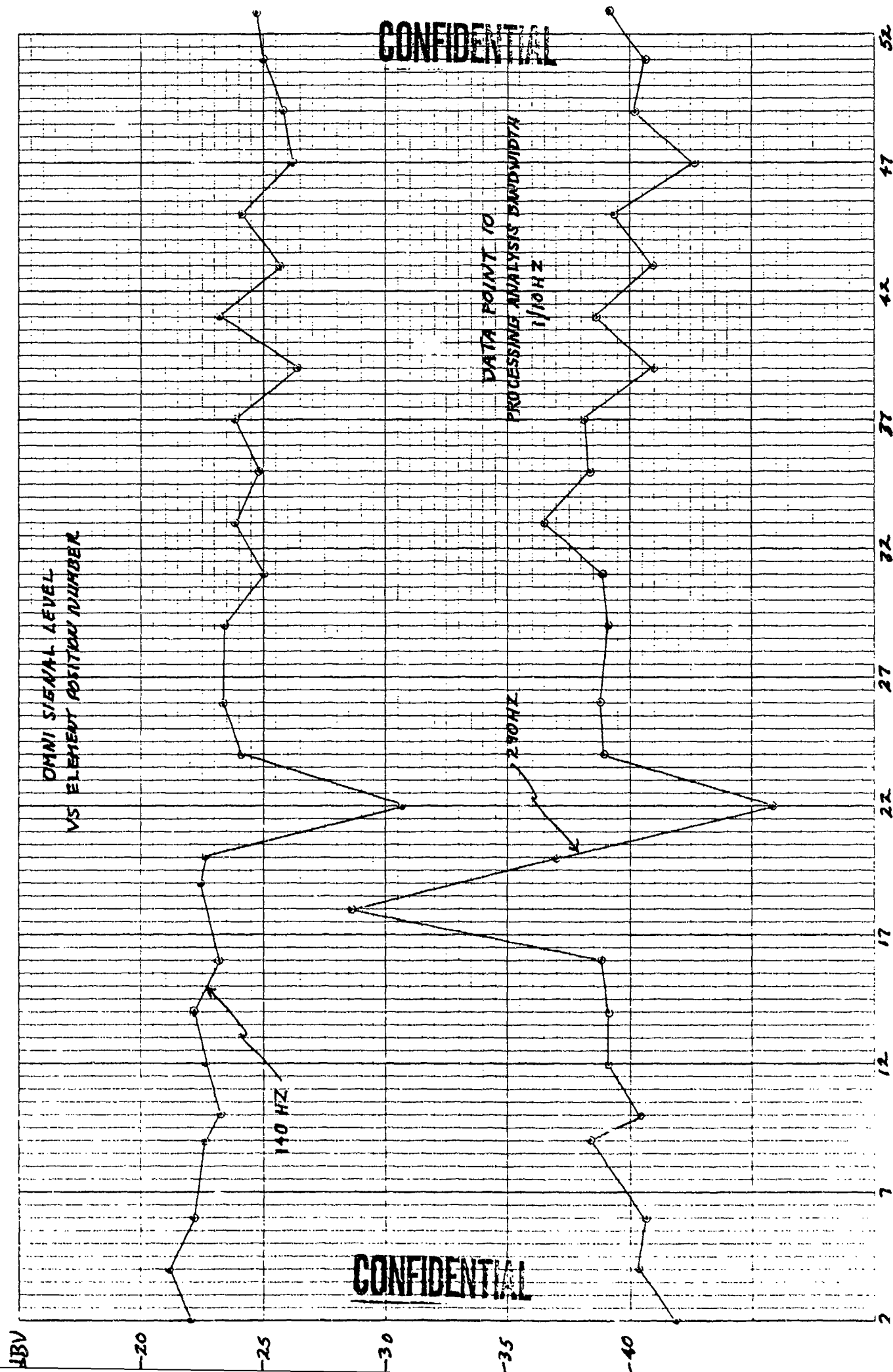
INDICATED NOISE LEVEL $\text{dBV} \frac{1}{\text{Hz}}$	<u>-51.6</u>
SYSTEM SENSITIVITY $\text{dB}/\mu\text{B}$	<u>-(-8) = -43.6</u>
BANDWIDTH CONVERSION TO 1 HZ BAND	<u>+6.2 = -35.4</u>
CONVERSION TO $\text{dBre}\mu\text{Pa}/1\text{Hz}$	<u>+100 = +64.6</u>

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K-5 10 X 10 TO THE INCH • 7 X 10 INCHES
KEUFFEL & ESSER CO. MADE IN U.S.A.



10 X 10 TO THE INCH 7 X 10 INCHES
KEUFFEL & ESSER CO. MADE IN U.S.A.

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CONTROL: 3-16 - 6633 (27)
OMNI SPECTRUM (ELEMENT 2)
EXERCISE: BEARING STAKE
CENTER FREQ: 150 HZ
1 ELEMENT

DATE OF ANALYSIS:

DATE/TIME: 3-16-77 - 0633 Z
ANALYSIS BANDWIDTH: 1/10 HZ
DEG AZ STEERING

REEL: M19 INDEX 1637

INTEGRATION TIME 320 SECS
ATTN: - DB
FILTER WTC: HANNING

150 HZ

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SECRET

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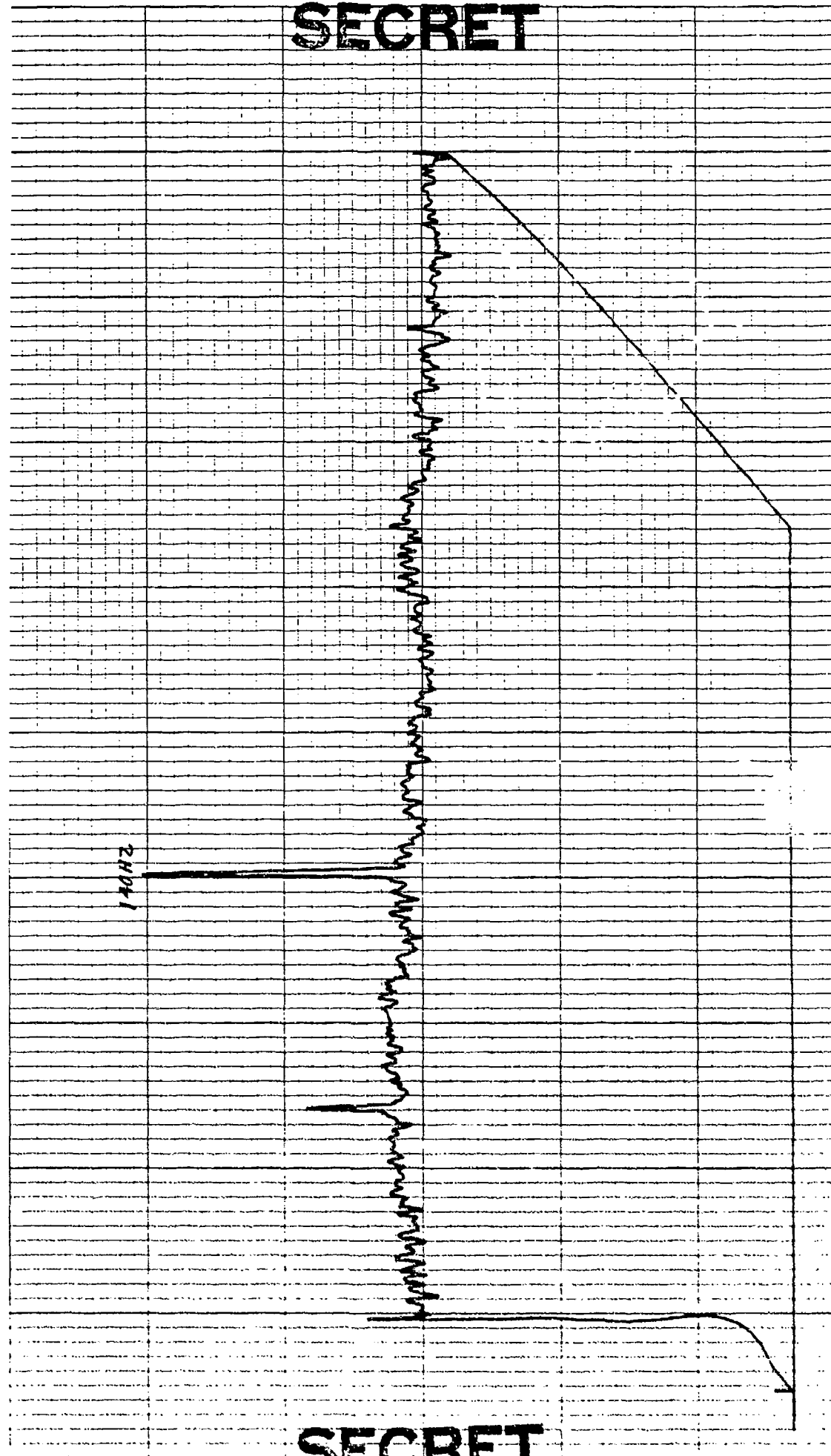
CONTROL: 3-16 -0633 (28)
OMNI SPECTRUM (ELEMENT 4)
EXERCISE: BEARING STAKE
CENTER FREQ: 150 HZ
1 ELEMENT

DATE OF ANALYSIS:

DATE/TIME: 3-16-77 -0633 Z
ANALYSIS BANDWIDTH: 1/10 HZ
— DEG AZ STEERING

REEL: M19 INDEX: 1637

INTEGRATION TIME 320 SECS ATTN: — DB
FILTER: WTG: 4ANNING



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CONTROL: 3-16-0633 (29)
OMNI SPECTRUM (ELEMENT 6)
EXERCISE: BEARING STAKE
CENTER FREQ: 150 HZ
1 ELEMENT

DATE OF ANALYSIS:

DATE/TIME: 3-16-77 -0633Z
ANALYSIS BANDWIDTH: 1/10 HZ
— DEC AZ STEERING

REEL: M19

INDEX: 1637

INTEGRATION TIME 320 SECS
ATTEN: DB
FILTER WTG: HANNING

140 HZ

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NEUFEL & ESSER CO. MADE IN U.S.A.

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CONTROL: 0000 - 49 (DPW)
OMNI SPECTRUM (ELEMENT 9)
EXERCISE: BEARING STAKE
CENTER FREQ: 140 HZ
1 ELEMENT

DATE OF ANALYSIS:

DATE/TIME: 3-6-77 - 0633 Z

ANALYSIS BANDWIDTH: 1/10 HZ
- DEG AZ STEERING

REEL: M19

INDEX: 1637

INTEGRATION TIME 320 SECS
FILTER

ATTN: - DB
WTG: HANNING

140 HZ

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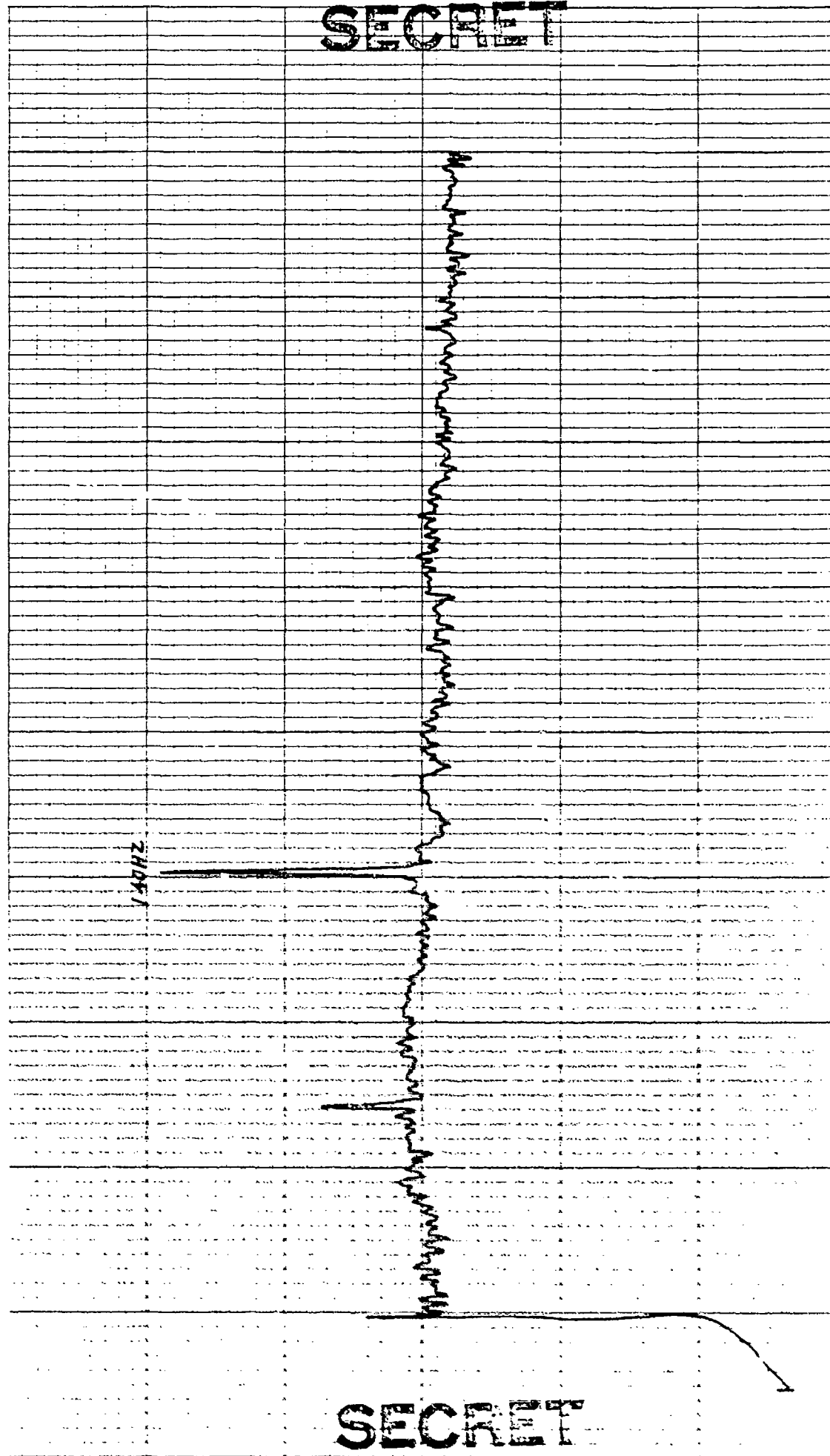
CONTROL: 3-16-0633 (31)
OMNI SPECTRUM (ELEMENT 10)
EXERCISE: BEARING STAKE
CENTER FREQ: 150 HZ
1 ELEMENT

DATE OF ANALYSIS:

DATE/TIME: 3-16-77 -0633 Z
ANALYSIS BANDWIDTH: 1/10 HZ
DEG AZ STEERING

REEL: M19 INDEX: 637

INTEGRATION TIME 320 SECS
ATTEN: - DB
FILTER WTG: HANNING



10.5 TO THE INCHES
1.5 INCHES

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CONTROL: 376-0622 (32)
OMNI SPECTRUM (ELEMENT 12)
EXERCISE: BEARING STAKE
CENTER FREQ: 150 HZ
1 ELEMENT

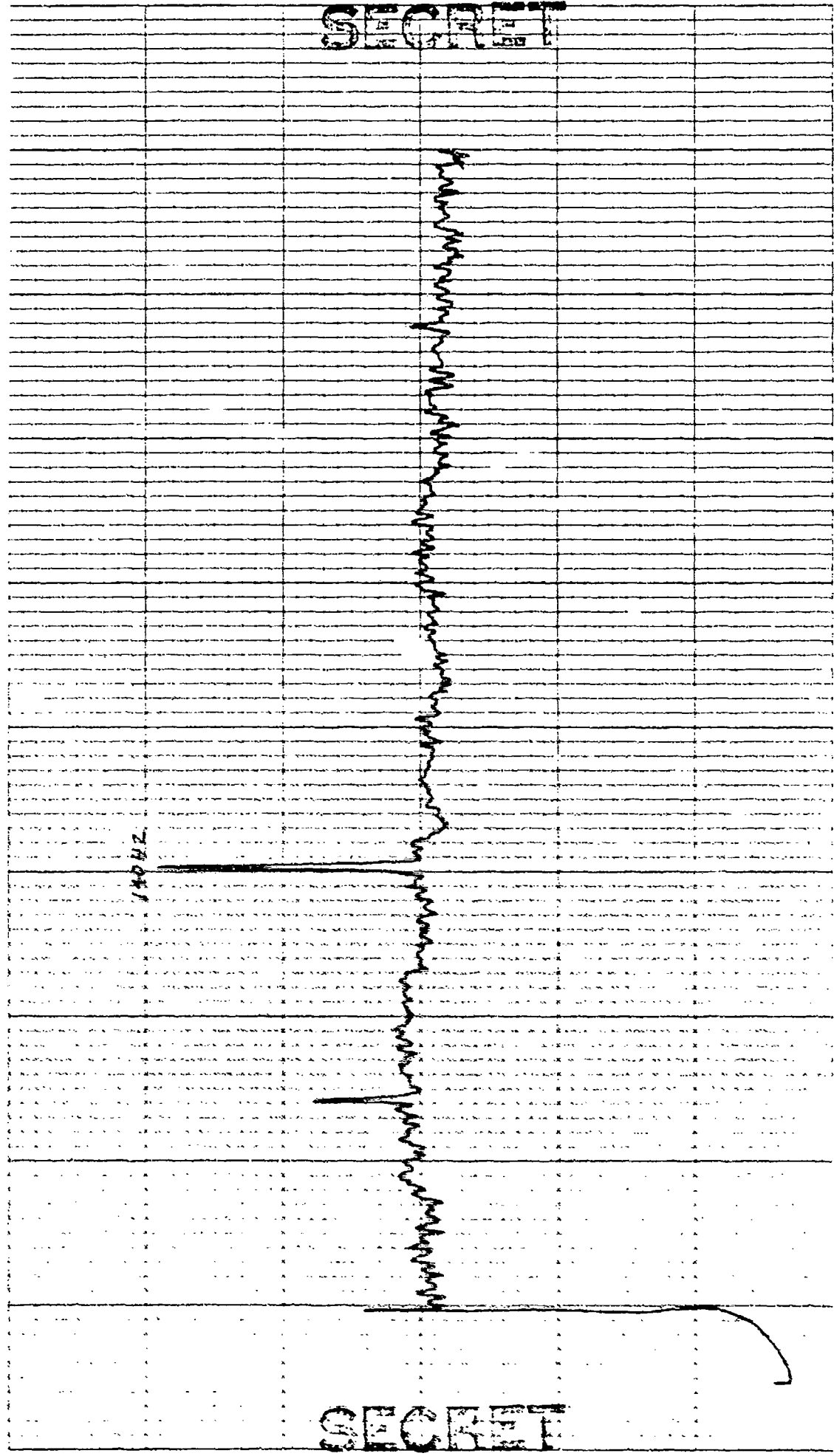
DATE OF ANALYSIS:

DATE/TIME: 376-77-0032

ANALYSIS BANDWIDTH: 1/10 HZ
— DEC AZ STEERING

REEL: 119 INDEX: 1637

INTEGRATION TIME 320 SECS
FILTER WTC: HANNING
ATTEN: - DB



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KΣ 10 X 10 TO THE INCH • 7 X 10 INCHES
KEUFFEL & ESSER CO. MADE IN U.S.A.

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CONTROL: 3-16 - 0633 (33)
OMNI SPECTRUM (ELEMENT 14)
EXERCISE: BEARING STAKE
CENTER FREQ: 150 HZ
1 ELEMENT

DATE OF ANALYSIS:

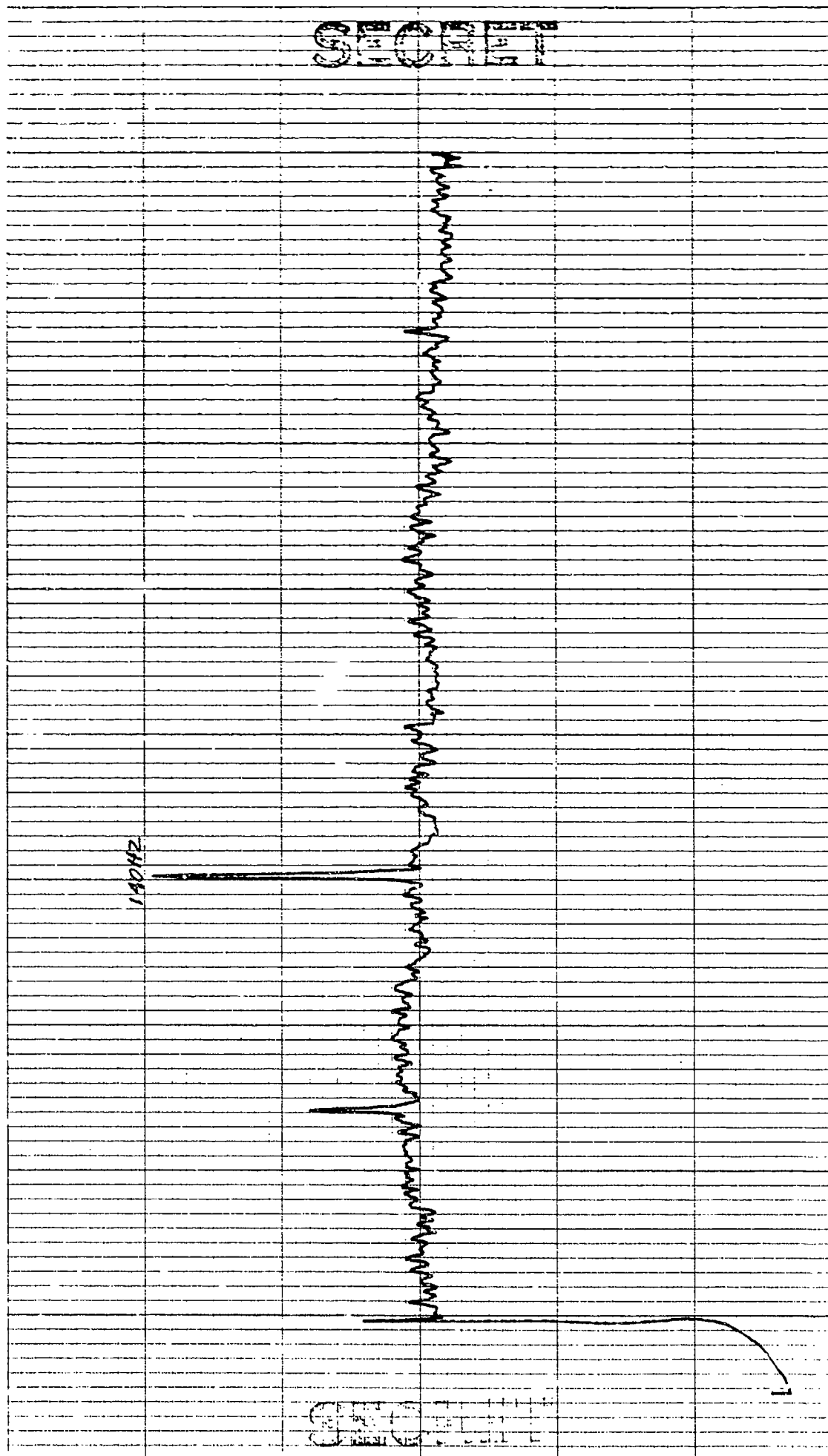
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ANALYSIS BANDWIDTH: 1/10 HZ
— DEG AZ STEERING

REEL: M19

INDEX: 1677

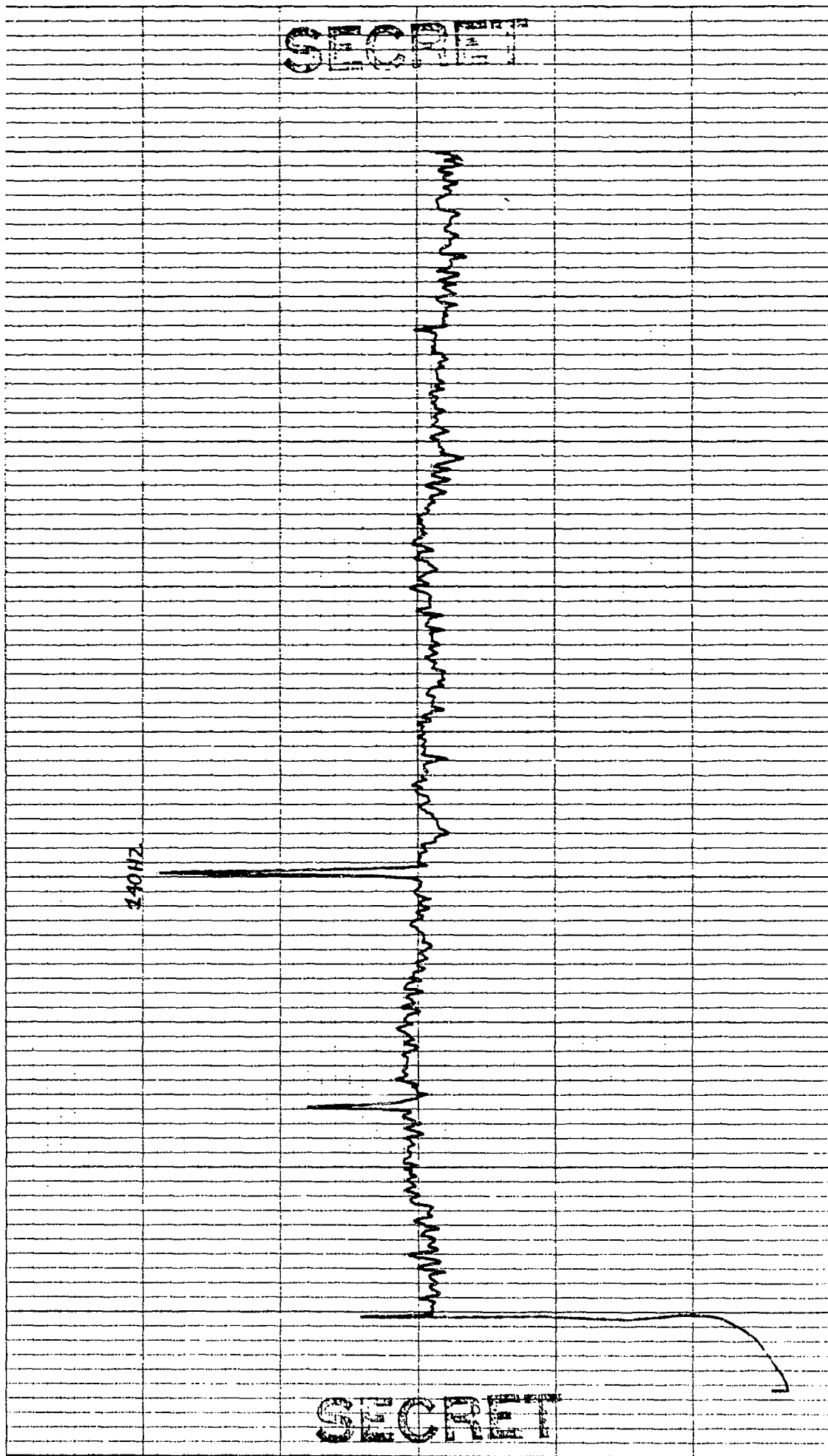
INTEGRATION TIME 320 SECS
ATTEN: DB
FILTER WTC: HANNING



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CONTROL: 3-16 - 0633 (34) DATE OF ANALYSIS: REEL: 419 INDEX: 637
OMNI SPECTRUM (ELEMENT 16)
EXERCISE: BEARING STAKE
CENTER FREQ: 150 HZ
INTEGRATION TIME 320 SECS
ATTEN: - DB
1 ELEMENT
— DEG AZ STEERING
FILTER WTG: HANNING

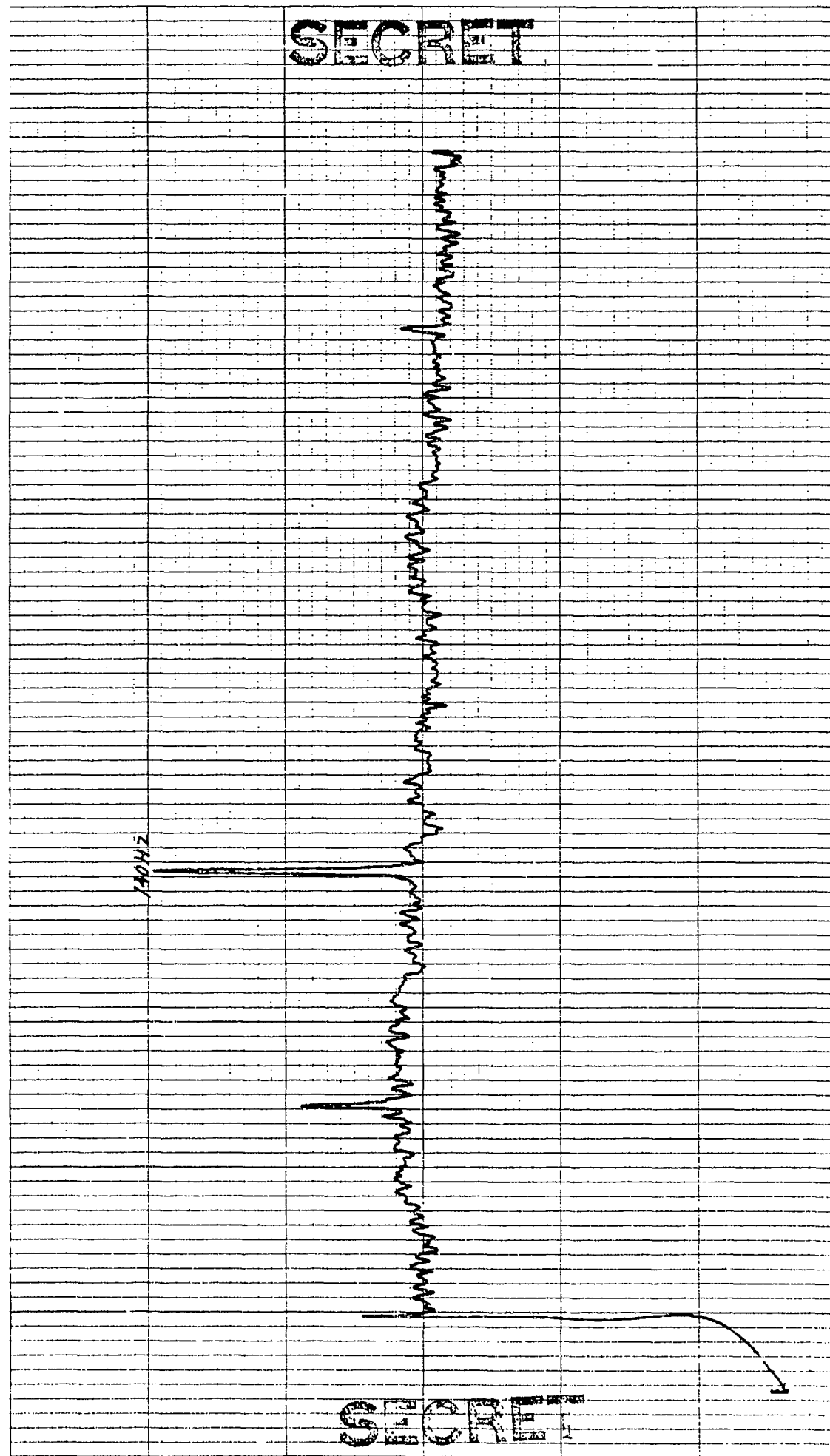


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DATE/TIME: 3-16-77 - 0633 Z
ANALYSIS BANDWIDTH: 1/10HZ
— DEG AZ STEERING

REEL: M19 INDEX: 637

INTEGRATION TIME 320 SECS ATTN: — DB
 FILTER WTC: HANNING



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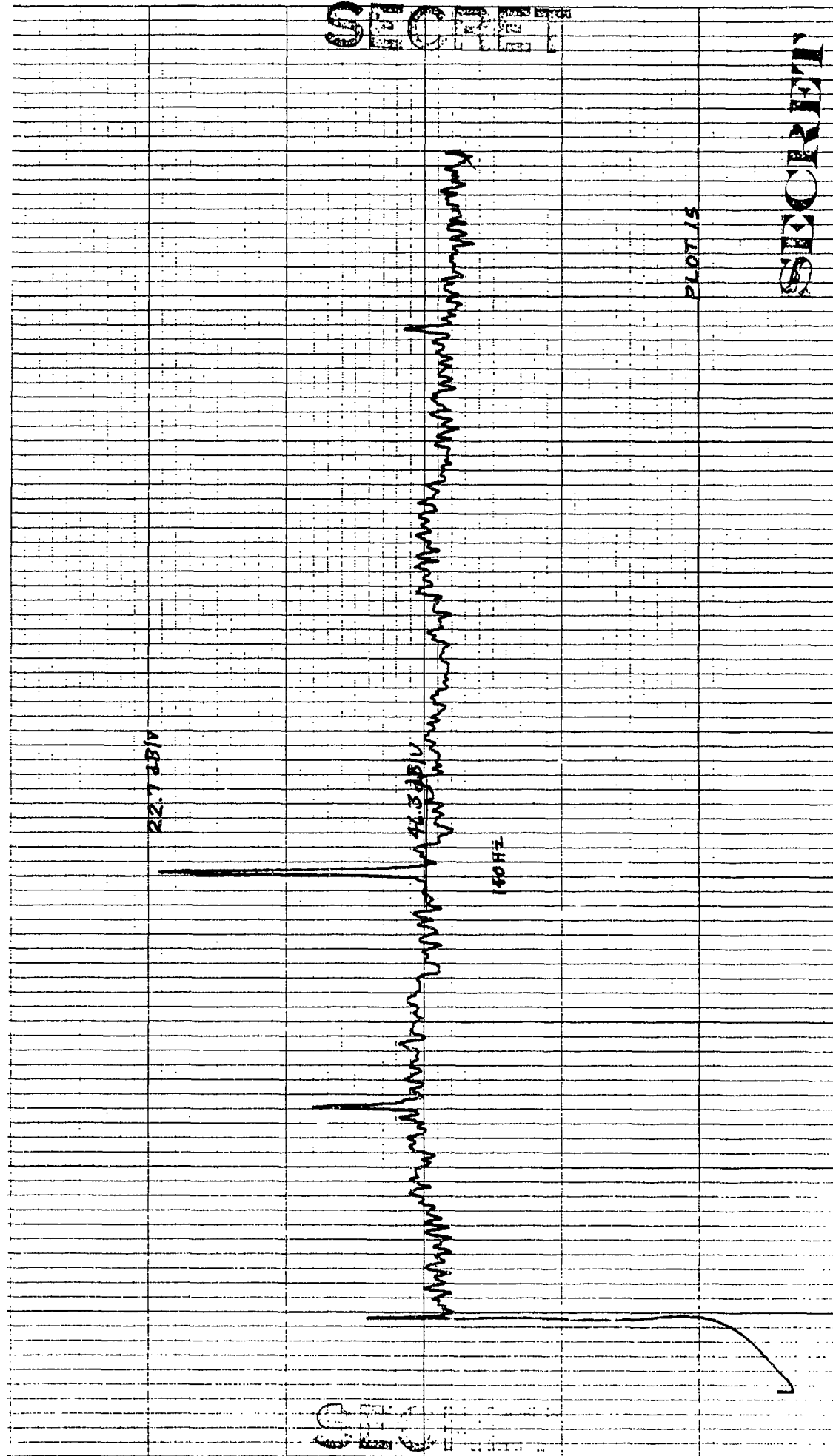
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OMNI SPECTRUM (ELEMENT 20)
EXERCISE: BEARING STAKE
CENTER FREQ: 150 HZ
1 ELEMENT

DATE OF ANALYSIS:

DATE/TIME: 3-16-77 - 0633 Z
ANALYSIS BANDWIDTH: 1/10 HZ
— DEG AZ STEERING

REEL: M19 INDEX: 1637

INTEGRATION TIME 320 SECS ATTN: — DB
FILTER WTG: HANNING



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160H2

K-E 10 X 10 TO THE INCH 7 X 10 INCHES
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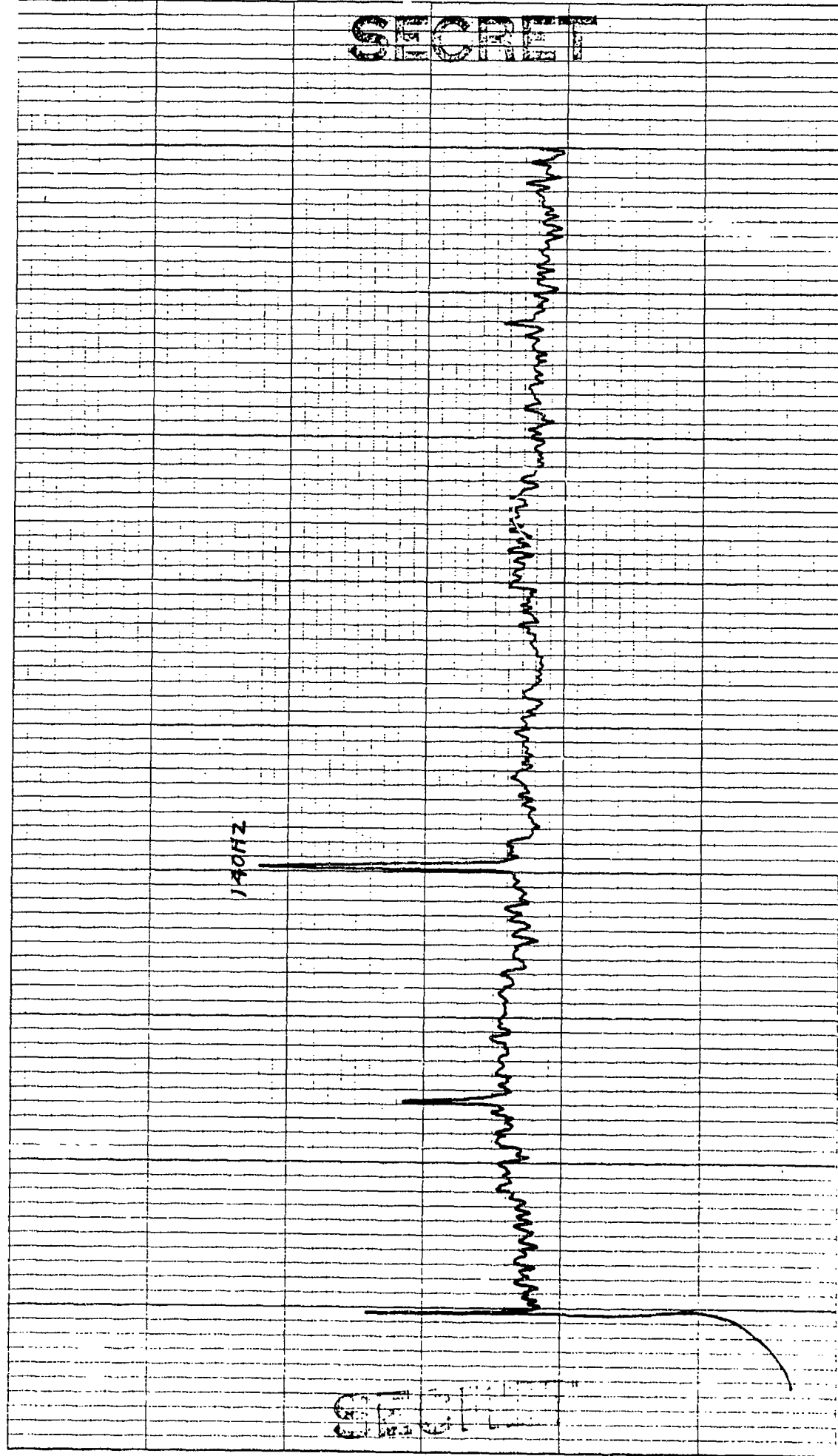
CONTROL: 376-1633 (37)
OMNI SPECTRUM (ELEMENT 22)
EXERCISE: BEARING STAKE
CENTER FREQ: 150 HZ
1 ELEMENT

DATE OF ANALYSIS:

DATE/TIME: 376-77-0633Z
ANALYSIS BANDWIDTH: 1/10 HZ
— DEG AZ STEERING

REEL: 419 INDEX: 1637

INTEGRATION TIME 320 SECS
FILTER WTG: HANNING
ATTN: — DB



10 X 10 TO THE INCH • 7 X 10 INCHES
KEUFFEL & ESSER CO. MADE IN U.S.A.

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CONTROL: 3-16 - 0633 (38)
OMNI SPECTRUM (ELEMENT 26)
EXERCISE: BEARING STAKE
CENTER FREQ: 150 HZ
1 ELEMENT

DATE OF ANALYSIS:

DATE/TIME: 3-16-77 - 0633 Z

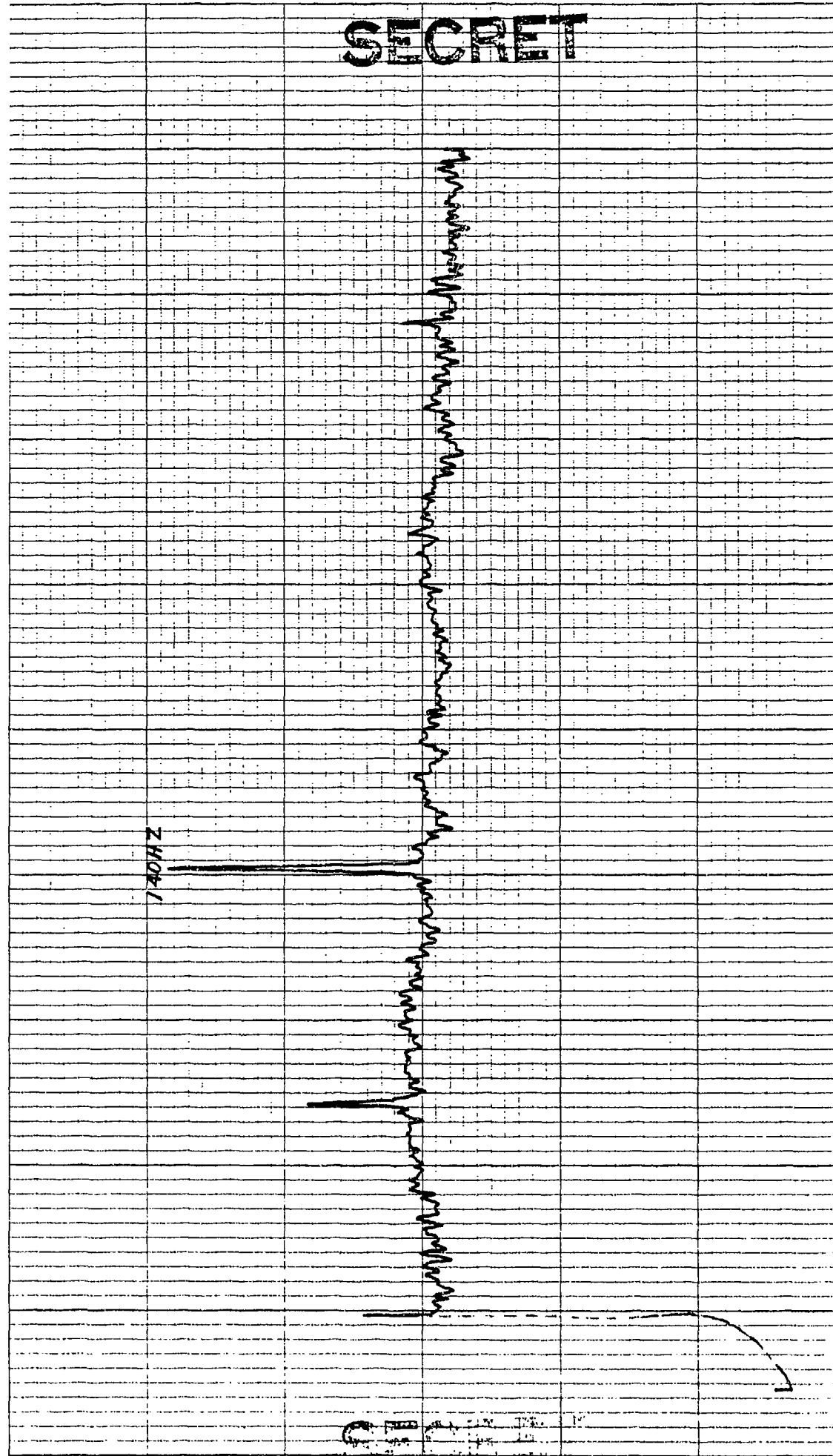
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— DEG AZ STEERING

REEL: M19

INDEX 637

INTEGRATION TIME 320 SECS
FILTER WTG: HANNING

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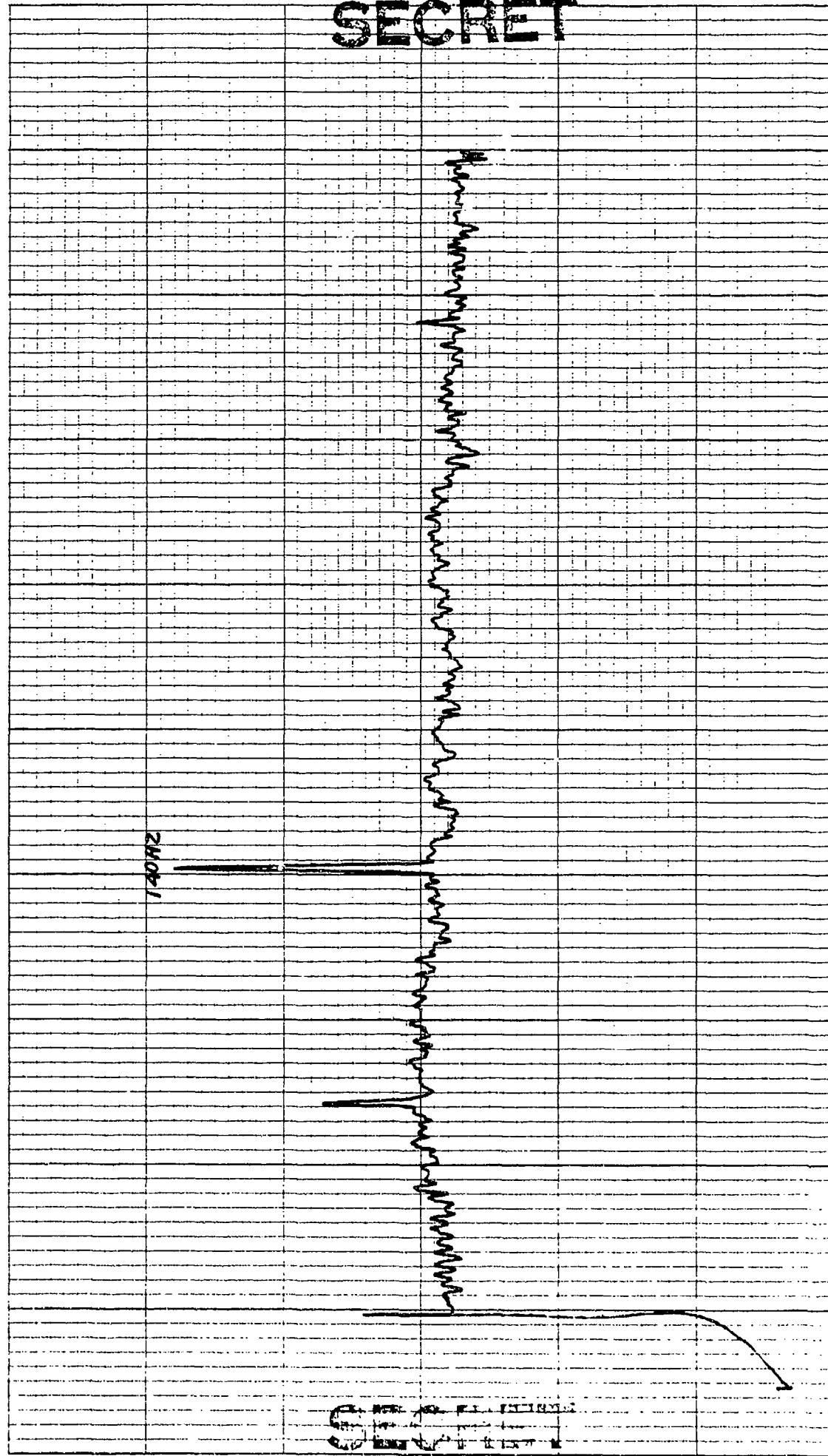
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OMNI SPECTRUM (ELEMENT 24)
EXERCISE: BEARING STAKE
CENTER FREQ: 150 HZ
1 ELEMENT

DATE OF ANALYSIS:

DATE/TIME: 3-16-77-0633Z
ANALYSIS BANDWIDTH: 1/10HZ
 DEG AZ STEERING

REEL: M19 INDEX 1637

INTEGRATION TIME 320 SECS ATTN: DB
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KEUFFEL & ESSER CO. MADE IN U.S.A.

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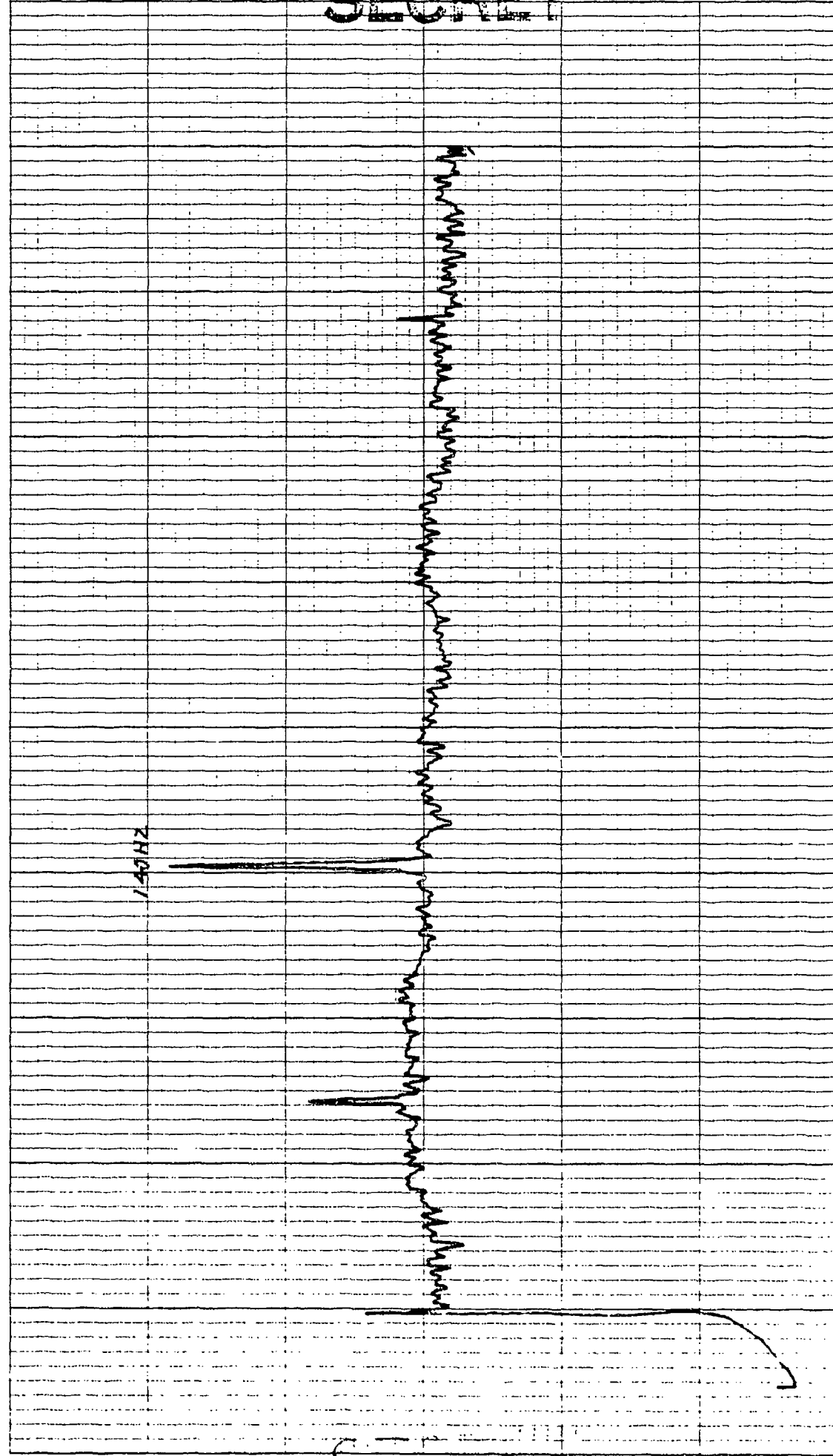
CONTROL: 3-16 -0633 (40)
OMNI SPECTRUM (ELEMENT 29)
EXERCISE: BEARING STAKE
CENTER FREQ: 150 HZ
1 ELEMENT

DATE OF ANALYSIS:

DATE/TIME: 3-16-77 -0633 Z
ANALYSIS BANDWIDTH: 1/10HZ
— DEG AZ STEERING

REEL: H19 INDEX: 1637

INTEGRATION TIME 320 SECS
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10 X 10 TO THE INCH • 7 X 10 INCHES
KEUFFEL & ESSLER CO. MADE IN U.S.A.

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CONTROL: 3-16-0633 (41)
OMNI SPECTRUM (ELEMENT 31)
EXERCISE: BEARING STAKE
CENTER FREQ: 150 HZ
1 ELEMENT

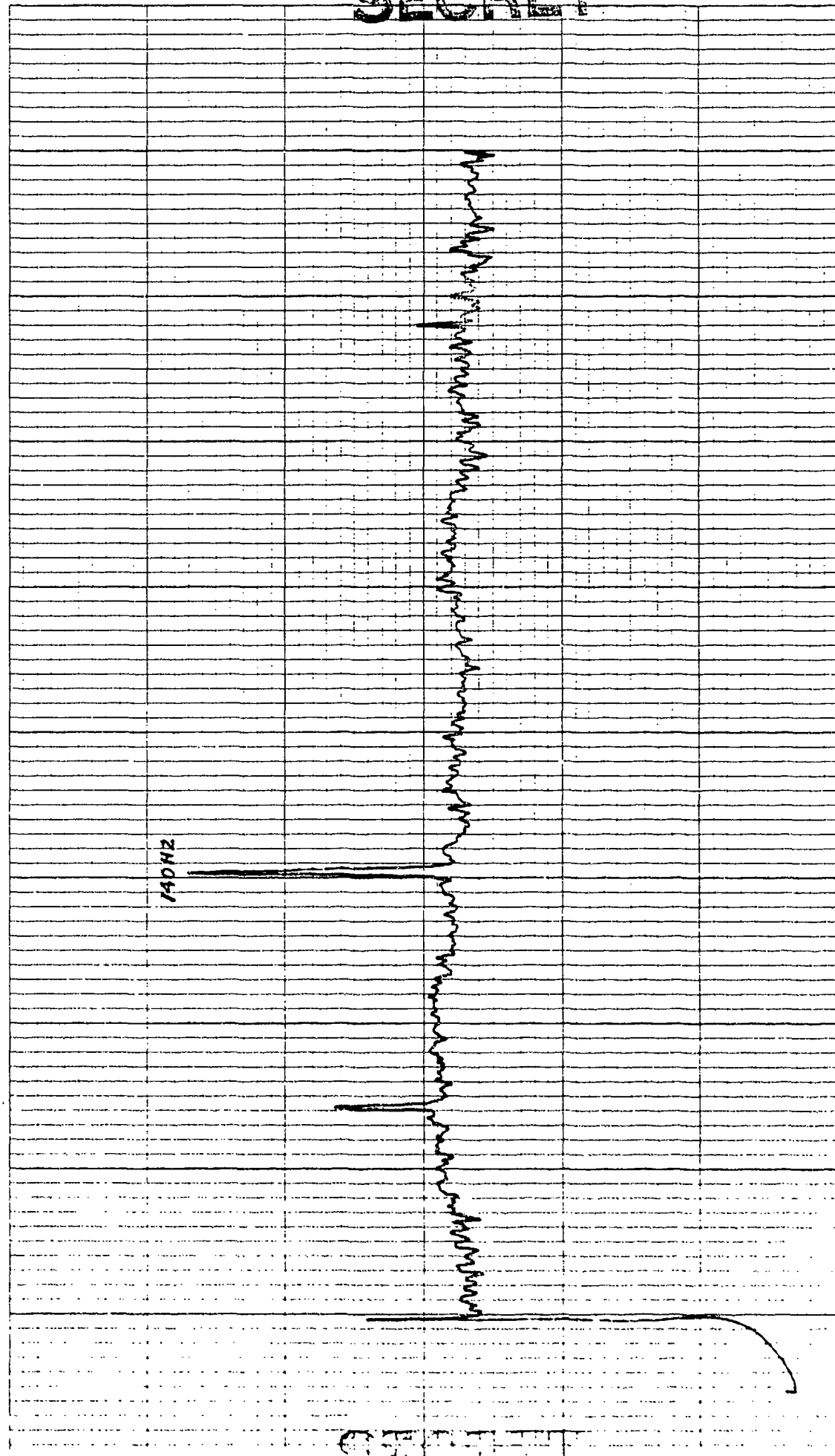
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DATE/TIME: 3-16-77 - 0633 Z
ANALYSIS BANDWIDTH: 1/10 HZ
 DEG AZ STEERING

REEL: M19

INDEX 637

INTEGRATION TIME 320 SECS
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WTC: HANNING



10 X 10 TO THE INCH • 7 X 10 INCHES
KEUFFEL & ESSER CO. MADE IN U.S.A.

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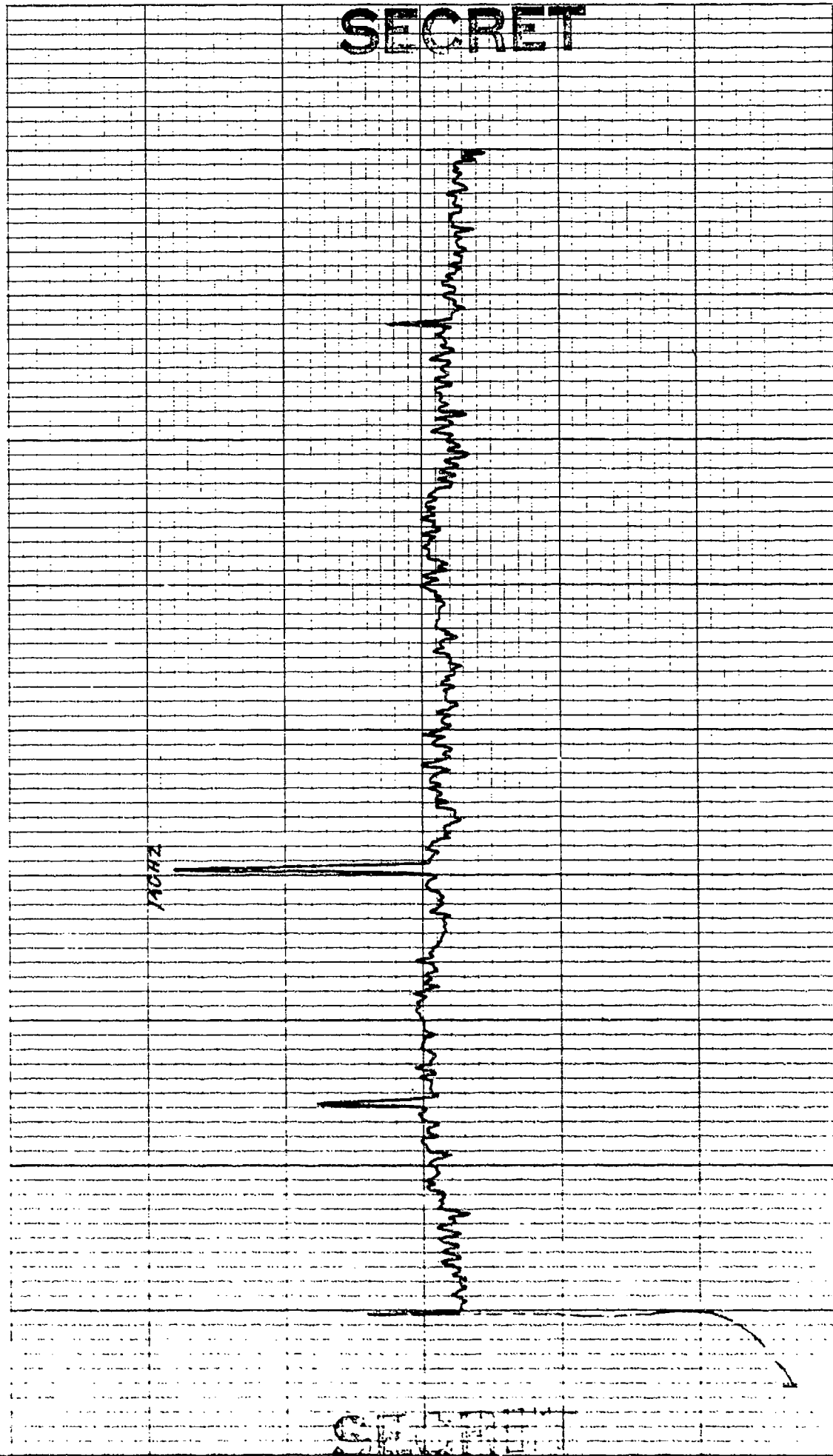
CONTROL: 3-16 -0633 (42)
OMNI SPECTRUM(ELEMENT 33)
EXERCISE: BEARING STAKE
CENTER FREQ: 150 HZ
1 ELEMENT

DATE OF ANALYSIS:

DATE/TIME: 3-16-77 -0633 Z
ANALYSIS BANDWIDTH: 1/10 HZ
— DEG AZ STEERING

REEL: H19 INDEX: 1637

INTEGRATION TIME 320 SECS
ATTEN: DB
FILTER
WTG: HANNING



K-2 10 X 10 TO THE INCH - 7 X 10 INCHES
HUFFEL & C. S. S. CO. MADE IN U.S.A.

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CONTROL: 3-16-0633 (43)
OMNI SPECTRUM (ELEMENT 35)
EXERCISE: BEARING STAKE
CENTER FREQ: 150 HZ
1 ELEMENT

DATE OF ANALYSIS:

DATE/TIME: 3-16-7-0633Z

ANALYSIS BANDWIDTH: 1/10HZ
DEG AZ STEERING

REEL: 419

INDEX: 637

INTEGRATION TIME 320 SECS
FILTER
ATTN: DB
WTG: HANNING

150 HZ

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CONTROL: 3-16-0633 (44)
OMNI SPECTRUM (ELEMENT 37)
EXERCISE: BEARING STAKE
CENTER FREQ: 150 HZ
! ELEMENT

DATE OF ANALYSIS:

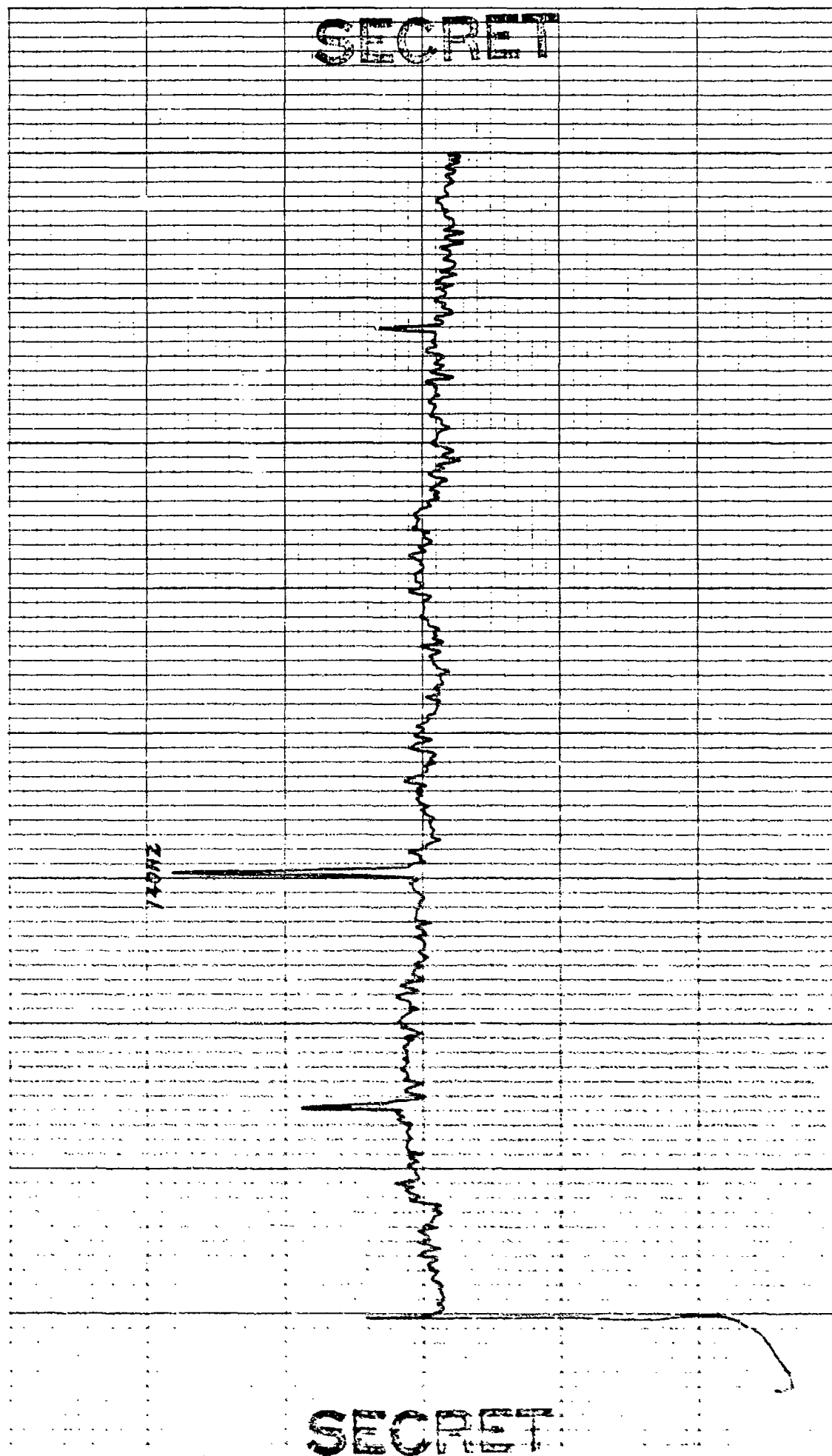
DATE/TIME: 3-16-77 - 0633 Z
ANALYSIS BANDWIDTH: 1/10HZ
-- DEG AZ STEERING

REEL: *M19* INDEX: *1637*

INTEGRATION TIME 320 SECS ATTN: DB
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10. X IS TO THE INCH. 1 X 10 INCHES
ALLEN & CO. MADE IN U.S.A.

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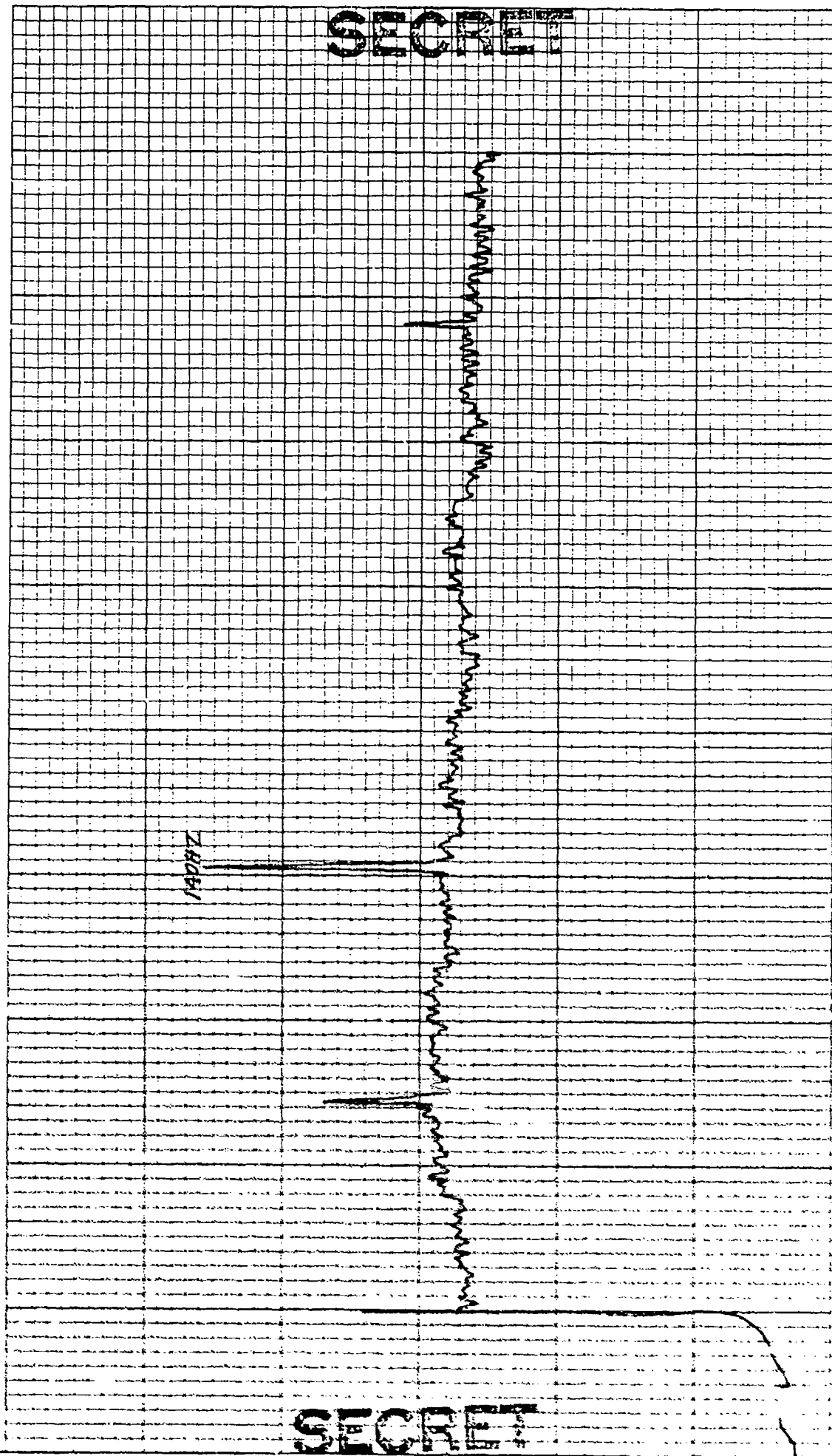
CONTROL: 3-16 -0633 (45)
OMNI SPECTRUM (ELEMENT 39)
EXERCISE: BEARING STAKE
CENTER FREQ: 150 HZ
1 ELEMENT

DATE OF ANALYSIS:

DATE/TIME: 3-16-77 -0633 Z
ANALYSIS BANDWIDTH: 1/10 HZ
_____ DEG AZ STEERING

REEL: 419 INDEX 1637

INTEGRATION TIME 320 SECS ATTN: - DB
FILTER WTG: HANNING



10 X 10 TO THE INCH
REUTEL & CSDEN CO. 4448 IN 411

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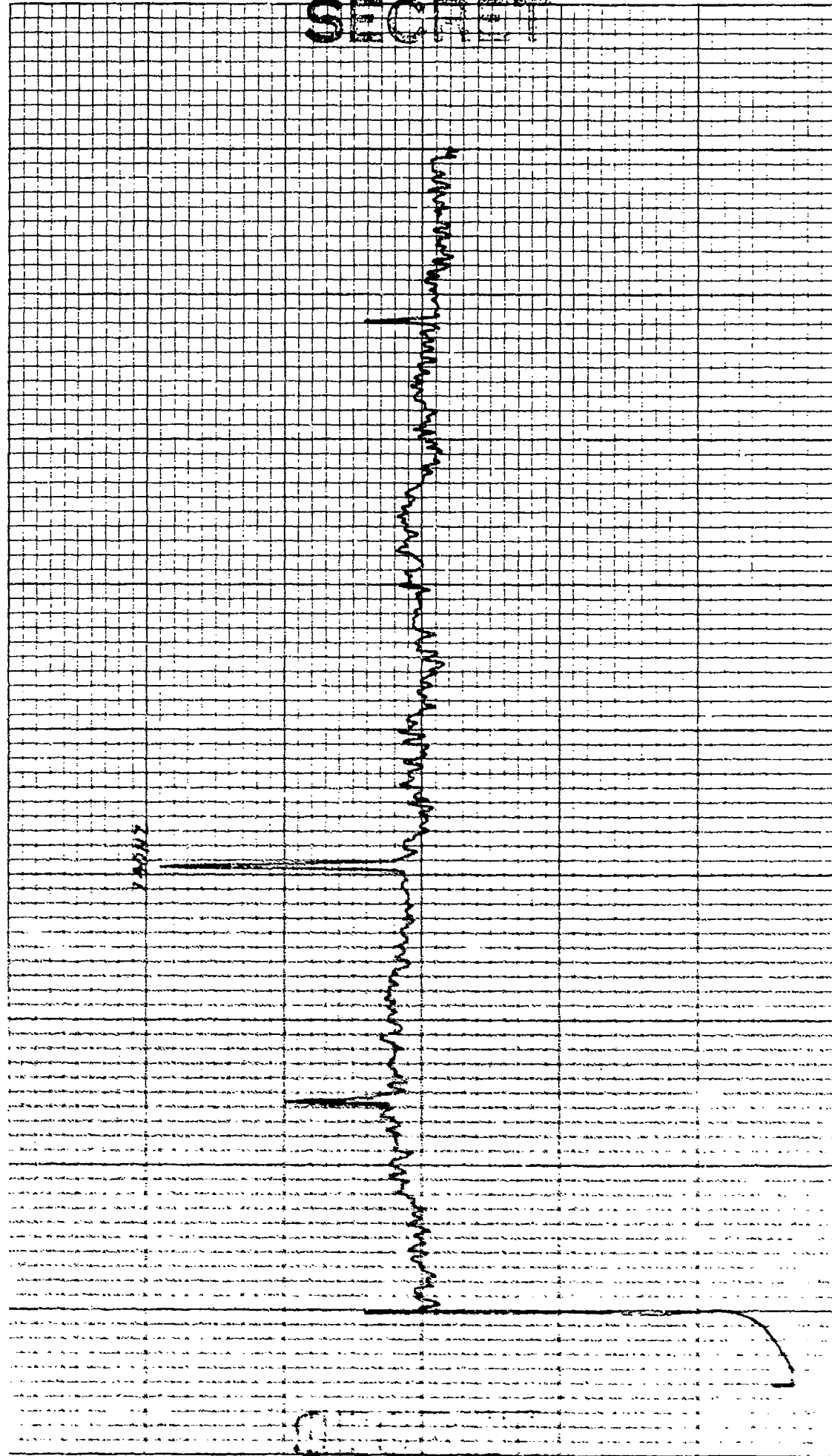
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OMNI SPECTRUM (ELEMENT 41)
EXERCISE: BEARING STAKE
CENTER FREQ: 150 HZ
1 ELEMENT

DATE OF ANALYSIS:

DATE/TIME: 3-16-77 - 0633 Z
ANALYSIS BANDWIDTH: 1/10 HZ
DEC AZ STEERING

REEL: M19 INDEX 1637

INTEGRATION TIME 320 SECS
FILTER
ATTEN: - DB
WTC: HANNING



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CONTROL: 3-14-0133 (47)
OMNI SPECTRUM (ELEMENT 43)
EXERCISE: BEARING STAKE
CENTER FREQ: 150 HZ
ELEMENT

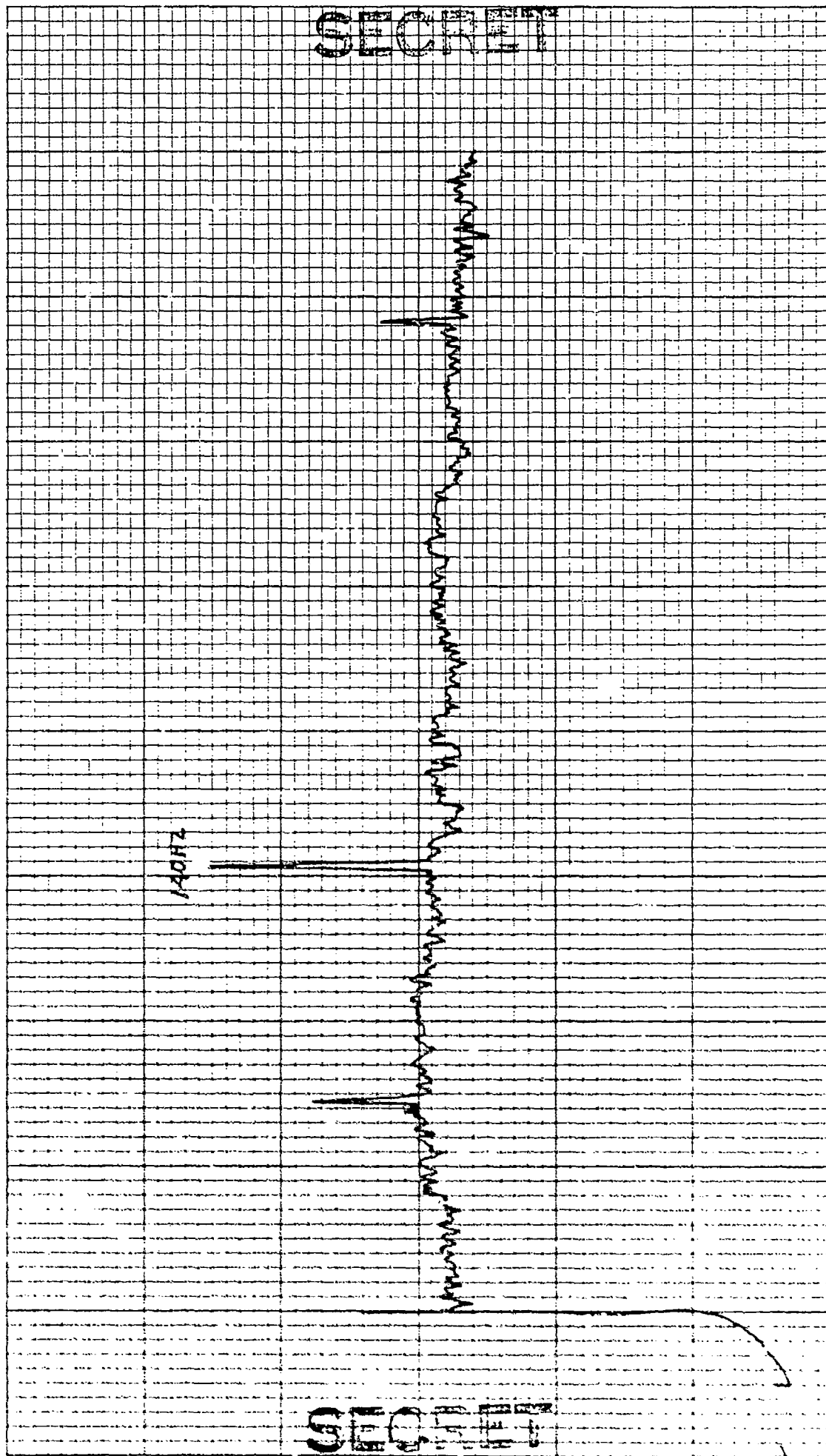
DATE OF ANALYSIS:

DATE/TIME: 3-16-77 - 0133 Z

ANALYSIS BANDWIDTH: 1/10 HZ
— DEG AZ STEERING

REEL: 1919 INDEX: 1037

INTEGRATION TIME 320 SECS ATTN: - DB
FILTER WTG: HANNING



46 0703

DATE OF ANALYSIS:

DATE/TIME: 3-16-77 - 0633Z
ANALYSIS BANDWIDTH: 1/10HZ
— DEC AZ STEERING

REEL: 419
INDEX: 637

INTEGRATION TIME 320 SECS ATTN: DB
FILTER WTG: HANNING

SECRET

74012

SECRET

K-2 10 X 10 TO THE INCH • 7 X 10 INCHES
KEUFFEL & ESSER CO. MADE IN U.S.A.

46 0703

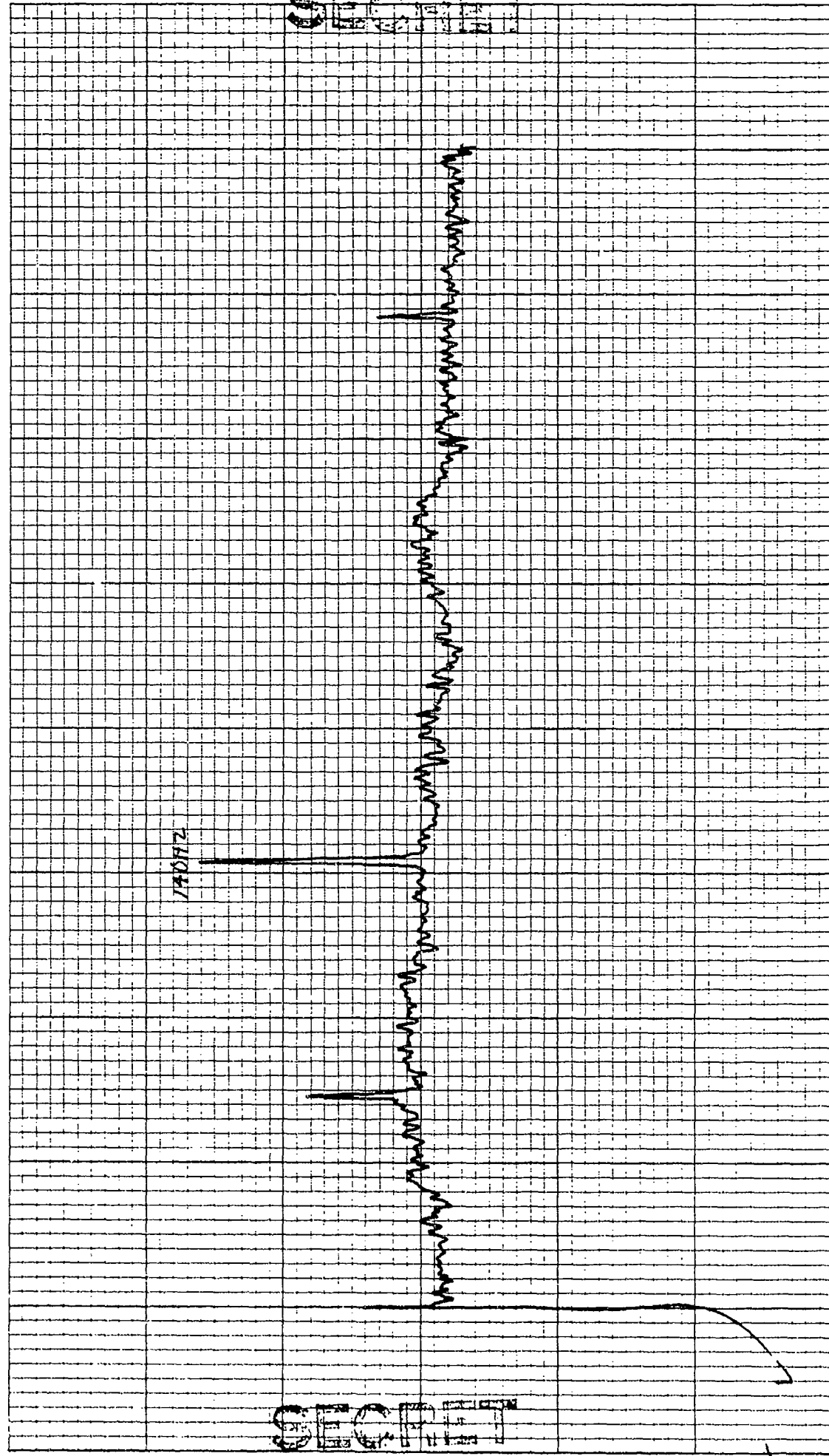
CONTROL: 3-16 - 0133 (49)
OMNI SPECTRUM (ELEMENT 47)
EXERCISE: BEARING STAKE
CENTER FREQ: 150 HZ
1 ELEMENT

DATE OF ANALYSIS:

DATE/TIME: 3-16-77 - 0133 Z
ANALYSIS BANDWIDTH: 1/10 HZ
— DEG AZ STEERING

REEL: 419 INDEX: 1137

INTEGRATION TIME 320 SECS
ATTEN: - DB
FILTER WTG: HANNING



K.E. 10 X 10 TO THE INCH • 7 X 10 INCHES
KEUFFEL & ESSER CO. MADE IN U.S.A.

46 0703

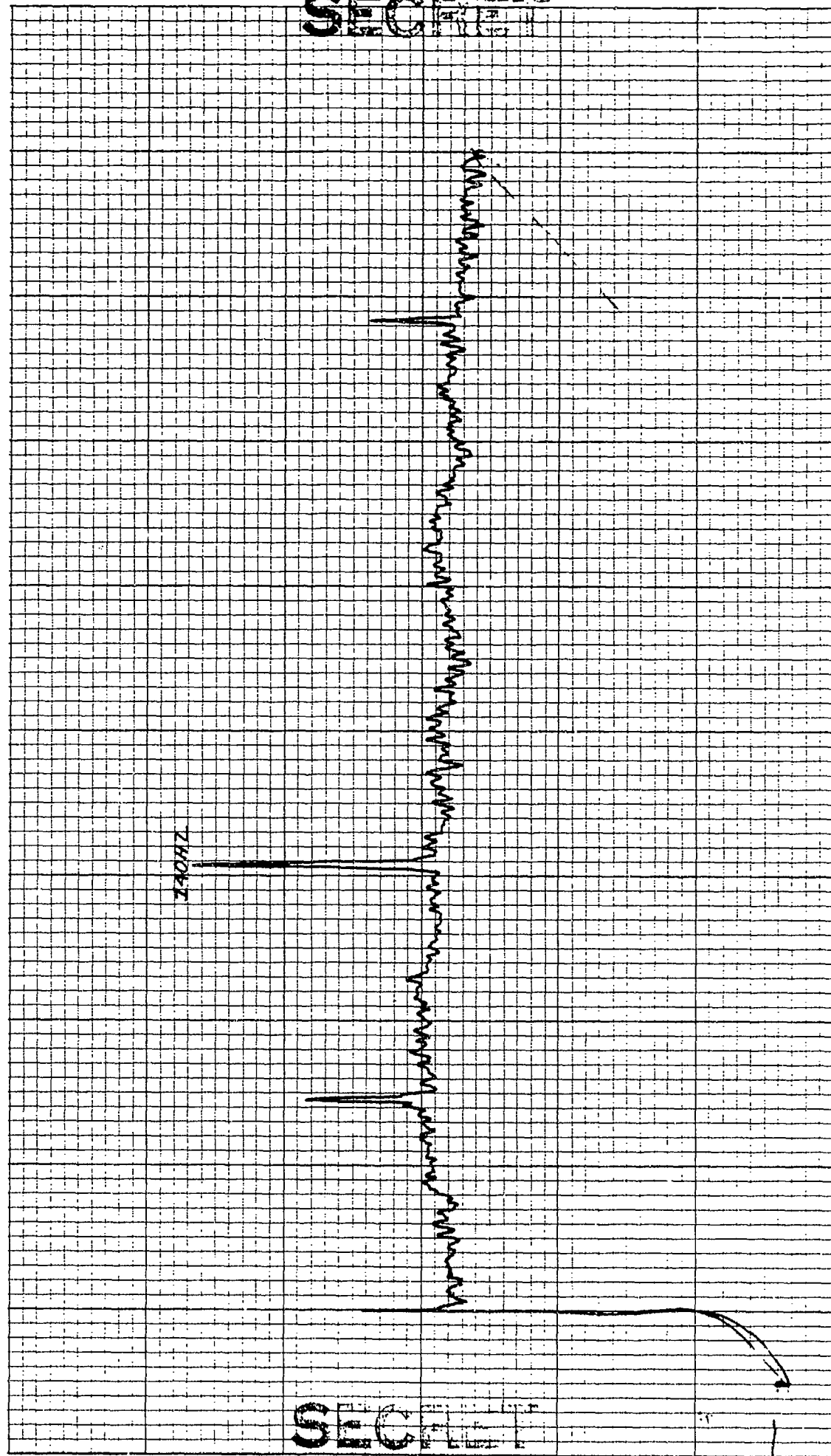
CONTROL: 3-16 -0633 (50)
OMNI SPECTRUM (ELEMENT 49)
EXERCISE: BEARING STAKE
CENTER FREQ: 150 HZ
1 ELEMENT

DATE OF ANALYSIS:

DATE/TIME: 3-16-77 - 0633 Z
ANALYSIS BANDWIDTH: 1/10 HZ
— DEG AZ STEERING

REEL: M19 INDEX 1637

INTEGRATION TIME 320 SECS ATTN: — DB
FILTER WTG: HANNING



KOE 10 X 10 TO THE INCH • 7 X 10 INCHES
KEUFFEL & ESSER CO. MADE IN U.S.A.

46 0703

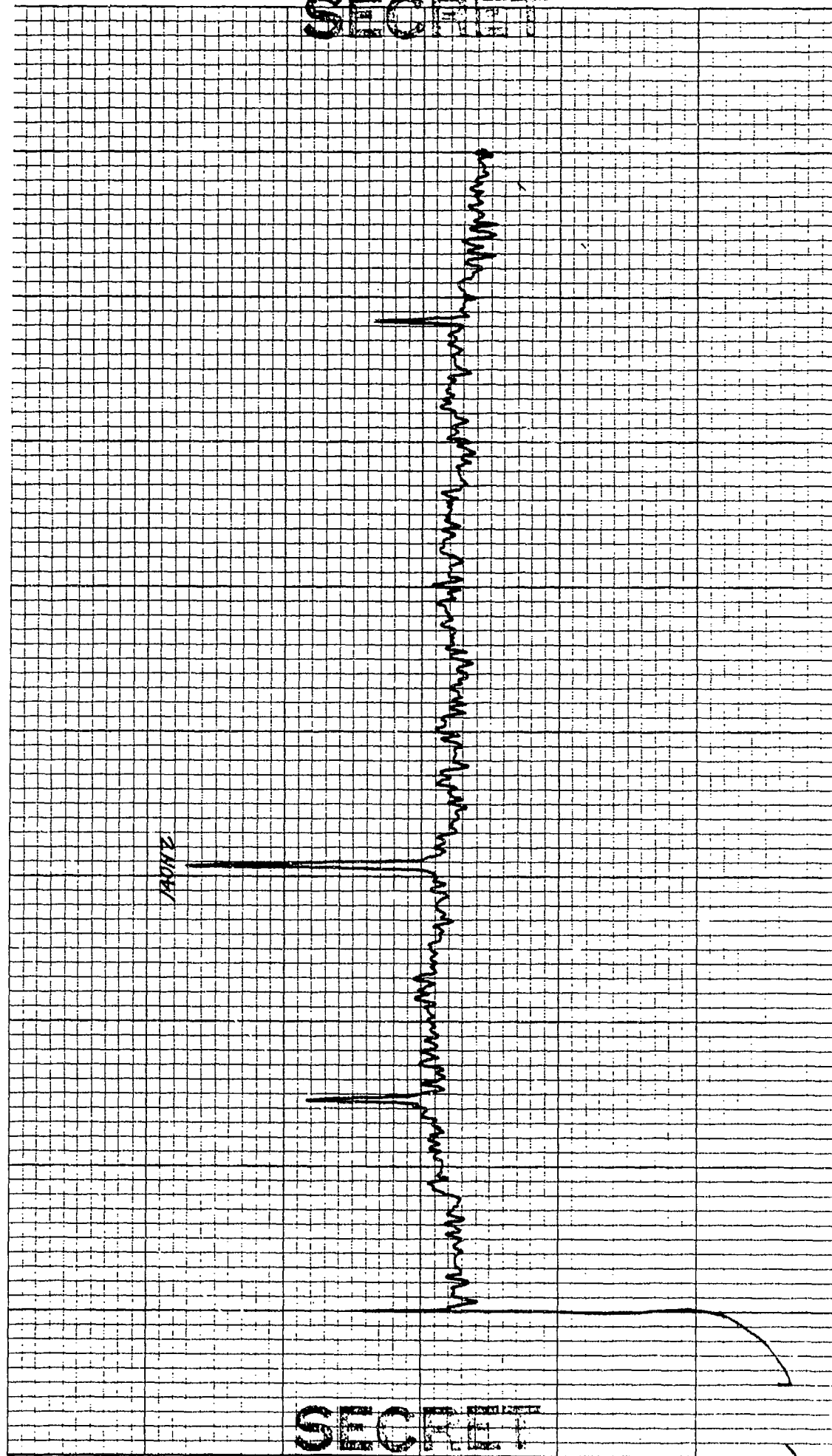
CONTROL: 3-16 -0633 (61)
OMNI SPECTRUM (ELEMENT 51)
EXERCISE: BEARING STAKE
CENTER FREQ: 150 HZ
1 ELEMENT

DATE OF ANALYSIS:

DATE/TIME: 3-16-77 -0633 Z
ANALYSIS BANDWIDTH: 1/10 HZ
— DEG AZ STEERING

REEL: 119 INDEX: 1637

INTEGRATION TIME 320 SECS
FILTER WTC: HANNING



K-E 10 X 10 TO THE INCH • 7 X 10 INCHES
KEUFFEL & ESSER CO. MADE IN U.S.A.

46 0703

CONTROL: 3-16 - 0633 (52)
OMNI SPECTRUM (ELEMENT 53)
EXERCISE: BEARING STAKE
CENTER FREQ: 150 HZ
1 ELEMENT

DATE OF ANALYSIS:

DATE/TIME: 3-6-77 - 0633 Z

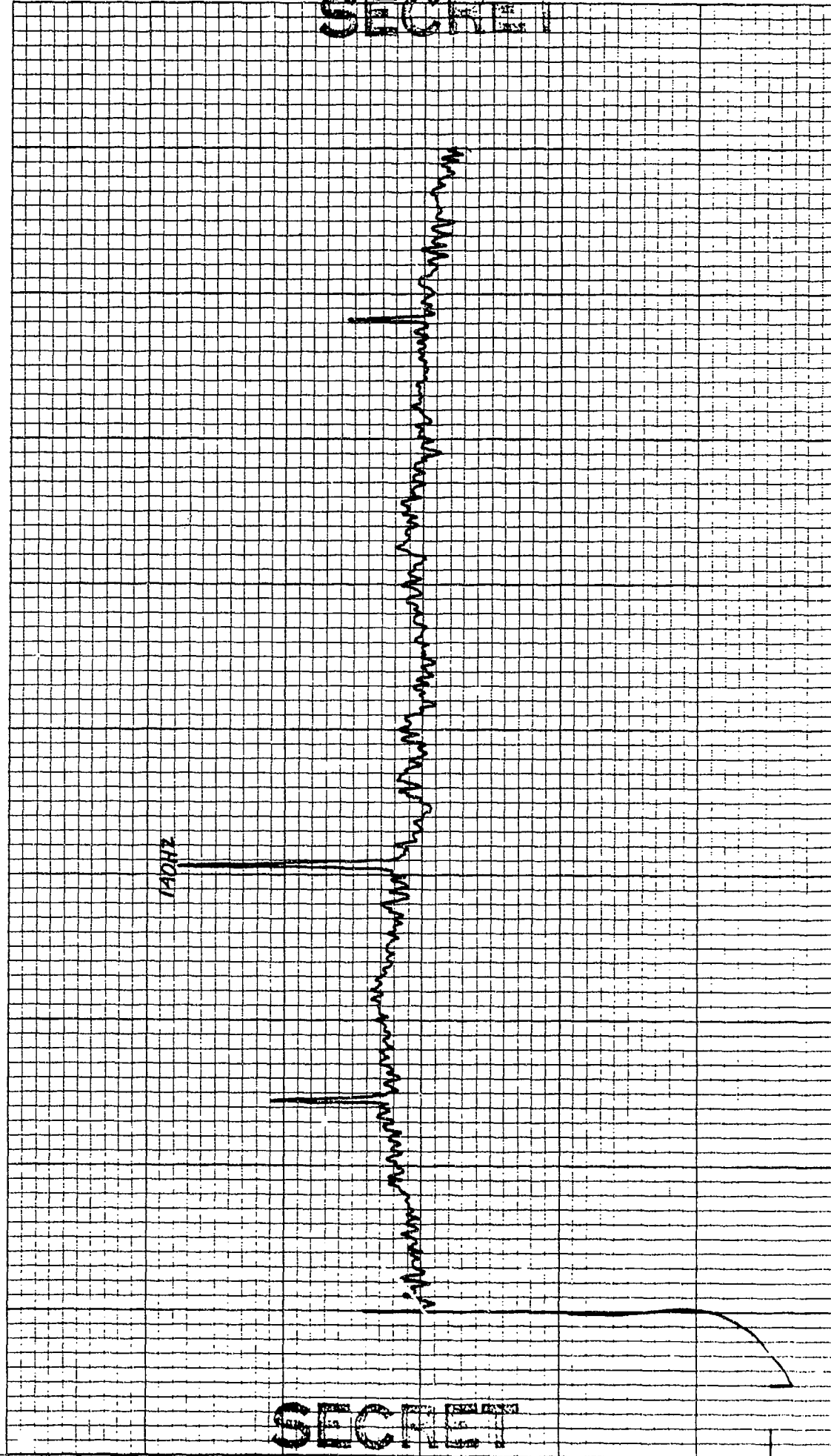
ANALYSIS BANDWIDTH: 1/10 HZ
— DEG AZ STEERING

REEL: M19

INDEX: 637

INTEGRATION TIME 320 SECS
FILTER

ATTEN: - DB
WTG: HANNING



SECRET

SECRET

K&E 10 X 10 TO THE INCH • 7 X 10 INCHES
KEUFFEL & ESSER CO. MADE IN U.S.A.

46 0703

1

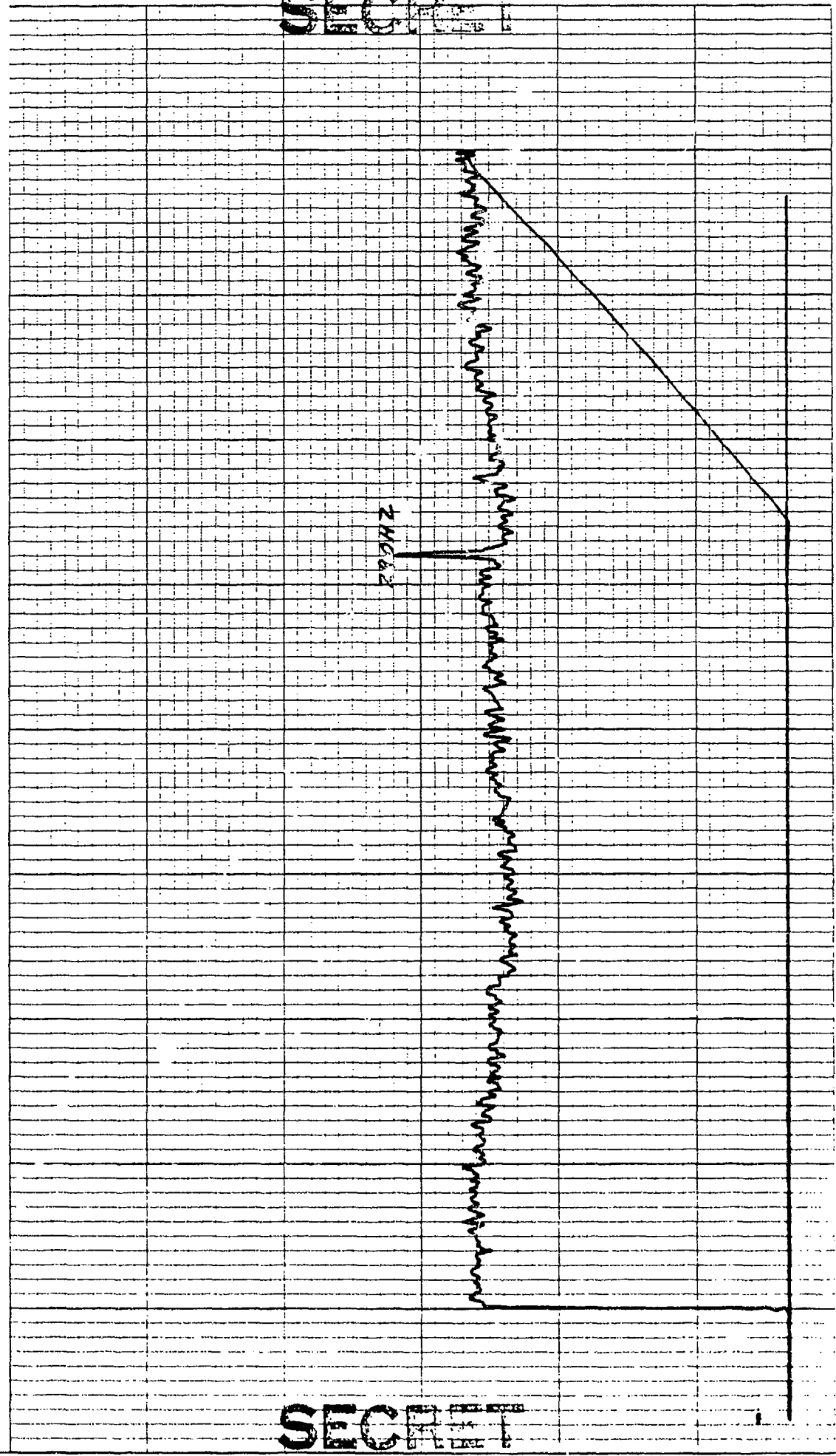
CONTROL: 3-16-0633 (1)
OMNI SPECTRUM (ELEMENT 2)
EXERCISE: BEARING STAKE
CENTER FREQ: 280 HZ
1 ELEMENT

DATE OF ANALYSIS:

DATE/TIME: 3-16-77 - 0633Z
ANALYSIS BANDWIDTH: 1/10 HZ
1 DEG AZ STEERING

REEL: N/9 INDEX: 1637

INTEGRATION TIME 320 SECS
ATTN: - DB
FILTER WTG: HANNING



SECRET

SECRET

K-2 10 X 10 TO THE INCH. X 10 INCHES
KEUFFEL & ESSER CO. MADE IN U.S.A.

46 0703

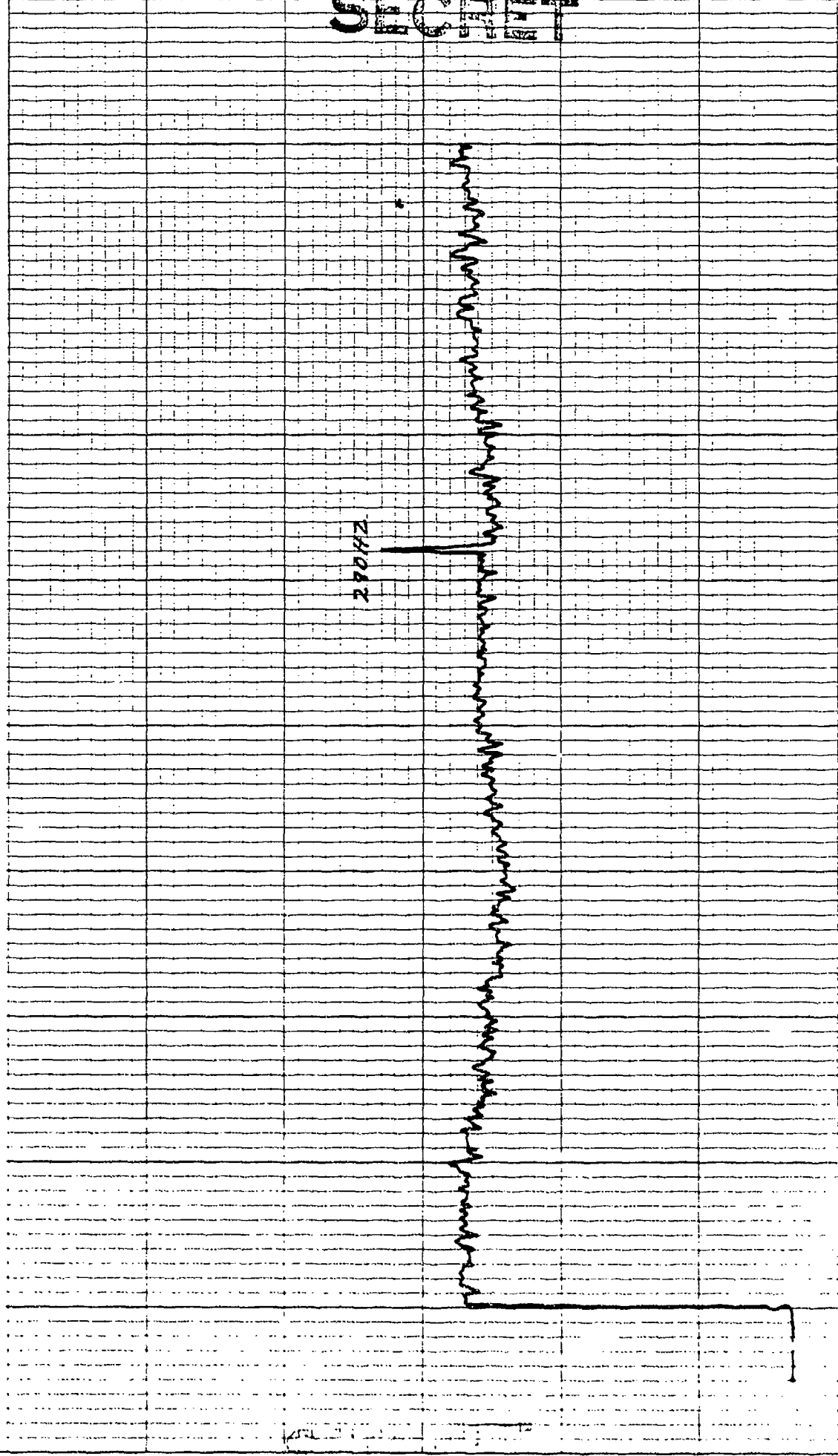
CONTROL: 376-0633 (2)
OMNI SPECTRUM (ELEMENT 4)
EXERCISE: BEARING STAKE
CENTER FREQ: 280 HZ
1 ELEMENT

DATE OF ANALYSIS:

DATE/TIME: 037677-0633 Z
ANALYSIS BANDWIDTH: 1/10 HZ
DEG AZ STEERING

REEL: M19 INDEX 1637

INTEGRATION TIME 320 SECS
FILTER WTC ATTN: DB
HANNING



SECRET

KOE 10 X 10 TO THE INCH • 7 X 10 INCHES
NEUFFEL & ESSER CO. MADE IN U.S.A.

46 0703

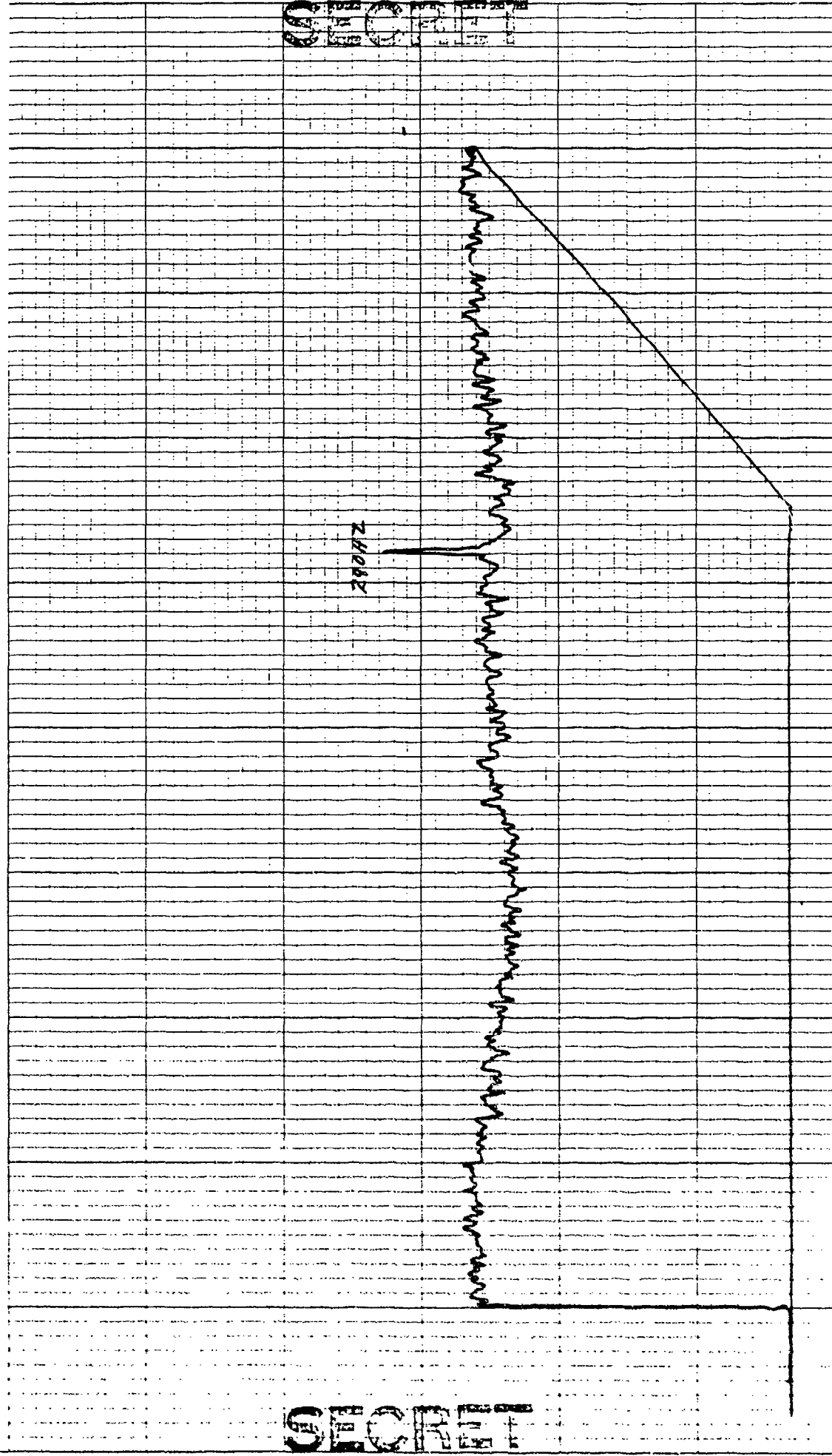
CONTROL: 3-16 - 0633 (3)
OMNI SPECTRUM (ELEMENT 6)
EXERCISE: BEARING STAKE
CENTER FREQ: 200 HZ
1 ELEMENT

DATE OF ANALYSIS:

DATE/TIME: 3-16-33 - 0633 Z
ANALYSIS BANDWIDTH: 1/10 HZ
1 DEG AZ STEERING

REEL: M19 INDEX 1637

INTEGRATION TIME 320 SECS
ATTEN: - DB
FILTER WTG: HANNING



KOE 10 X 10 TO THE INCH • 1 X 10 INCHES
MEUFFEL & ESSER CO. MADE IN U.S.A.

46 0703

CONTROL: 3-16 - 0633 (4)
OMNI SPECTRUM (ELEMENT 9)
EXERCISE: BEARING STAKE
CENTER FREQ: 280 HZ
1 ELEMENT

DATE OF ANALYSIS:

DATE/TIME: 3-16-77 - 0633 Z

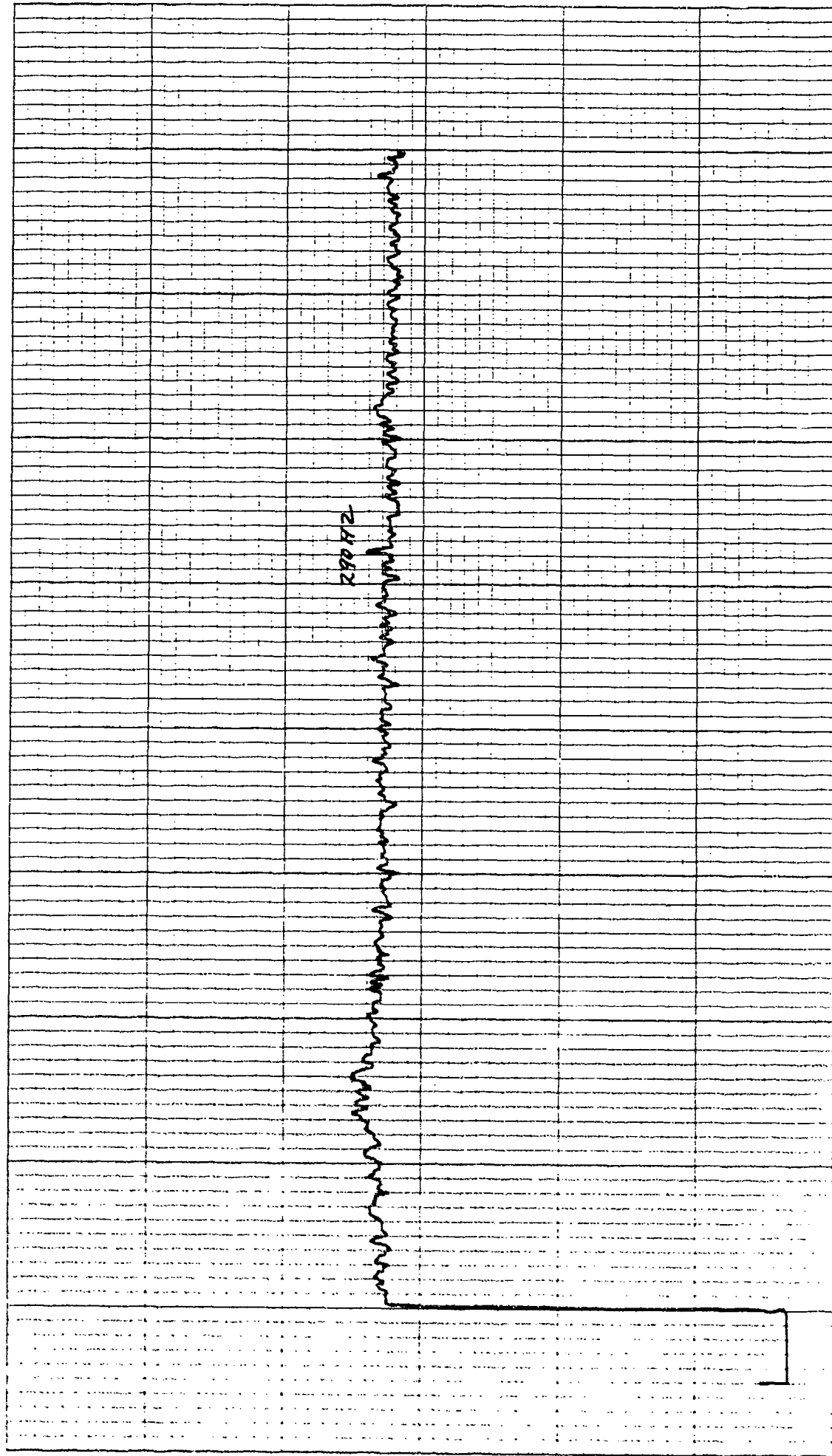
ANALYSIS BANDWIDTH: 1/10 HZ
— DEG AZ STEERING

REEL: M19

INDEX: 637

INTEGRATION TIME 320 SECS
FILTER — DB

ATTN: — DB
WTG: HANNING



10 X 10 TO THE INCH • 7 X 10 INCHES
KEUFFEL & ESSER CO. MADE IN U.S.A.

46 0703

CONTROL: 3-16-77-0633 (5) DATE OF ANALYSIS: REEL: 119 INDEX: 6JZ
OMNI SPECTRUM (ELEMENT 10)
EXERCISE: BEARING STAKE
CENTER FREQ: 280 HZ ANALYSIS BANDWIDTH: 1/10 HZ INTEGRATION TIME 320 SECS ATTN: - DB
1 ELEMENT ———— DEG AZ STEERING FILTER WTG: HANNING

SECRET

290 HZ

SECRET

10 X 10 TO THE INCH - X 10 INCHES
KEUFFEL & ESSER CO. MADE IN U.S.A.

SECRET

46 0703

CONTROL: 0633-49 (DPIO)
OMNI SPECTRUM (ELEMENT 12)
EXERCISE: BEARING STAKE
CENTER FREQ: 280 HZ
1 ELEMENT

DATE OF ANALYSIS:

DATE/TIME: J-16-77 -0633 Z

ANALYSIS BANDWIDTH: 1/10 HZ

- DEG AZ STEERING

REEL: M19

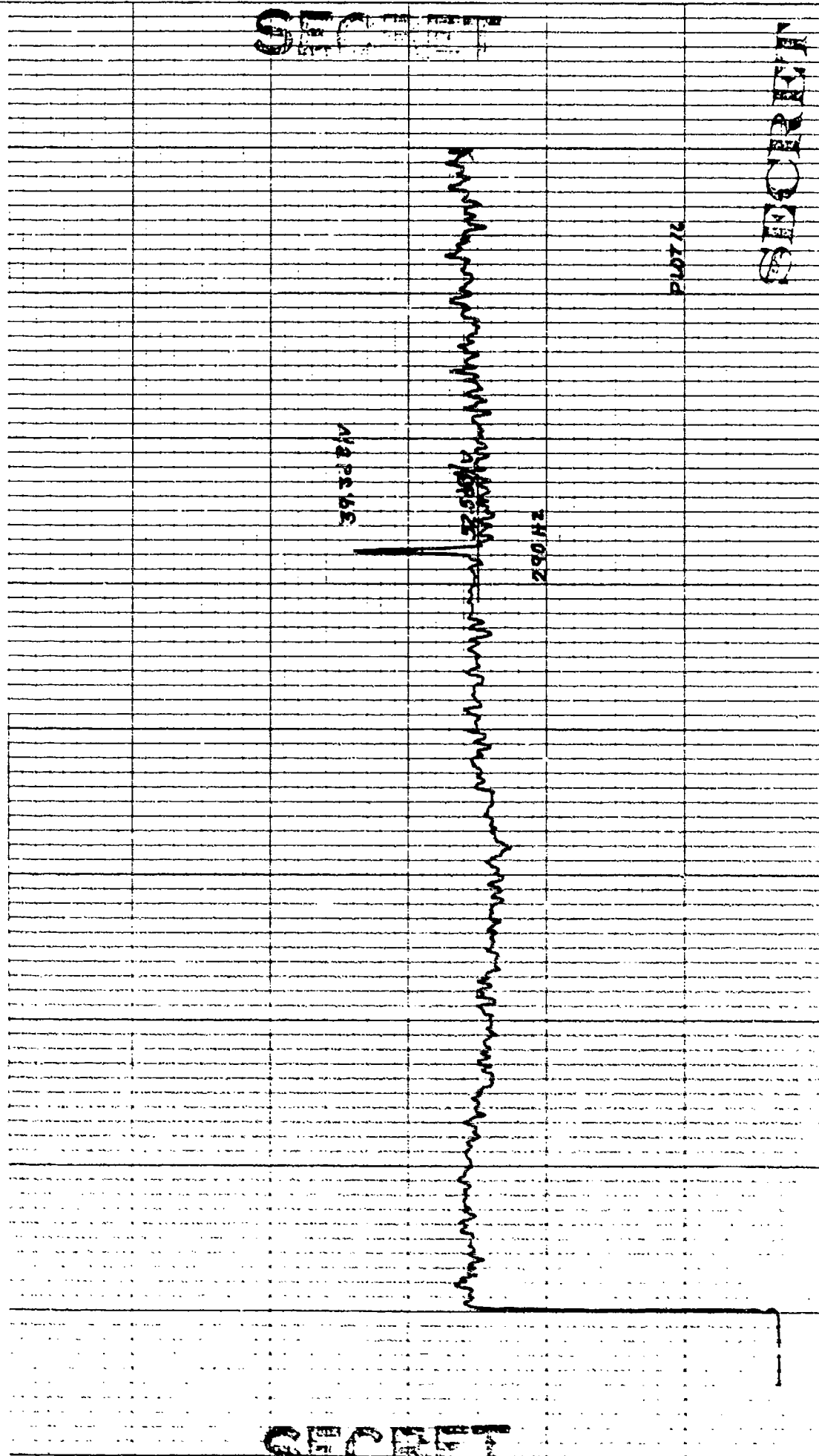
INDEX 1637

INTEGRATION TIME 320 SECS

ATTEN: - DB

FILTER

WTG: HANNING



24 HZ

280 HZ

310 HZ

KOE 10.4 10 TO THE INCHES 1 TO THE HRS
RECEIVED 10/10/77 10:10 AM

46 0703

CONTROL: 3-16 - 0013 (2)
OMNI SPECTRUM(ELEMENT 14)
EXERCISE: BEARING STAKE
CENTER FREQ: 260 HZ
1 ELEMENT

DATE OF ANALYSIS:

DATE/TIME: 3-16-77 - 0013 Z
ANALYSIS BANDWIDTH: 1/10 HZ
— DEC AZ STEERING

REEL: 419 INDEX/637

INTEGRATION TIME 320 SECS ATTN: — DB
FILTER WTG: HANNING

SECRET

290 HZ

SECRET

10E 12 X 10 TO THE INCHES
RECEIVED 10/20/77

46 0703

CONTROL: 1-16-0633(8)
OMNI SPECTRUM(ELEMENT 16)
EXERCISE: BEARING STAKE
CENTER FREQ: 280 HZ
1 ELEMENT

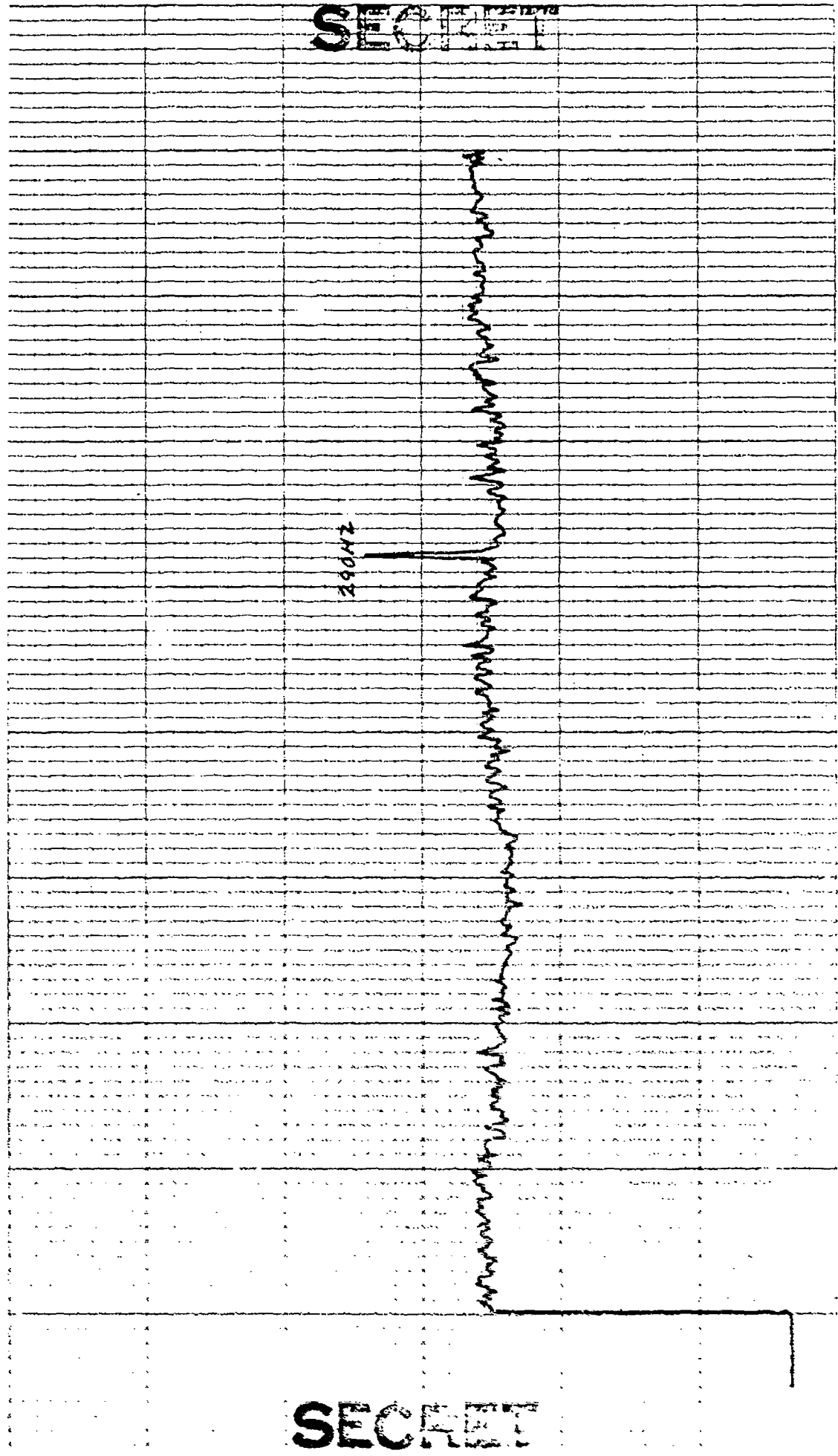
DATE OF ANALYSIS:

DATE/TIME: 3-16-77 - 0633 Z
ANALYSIS BANDWIDTH: 1/10 HZ
DEC AZ STEERING

REEL: N19

INDEX: 617

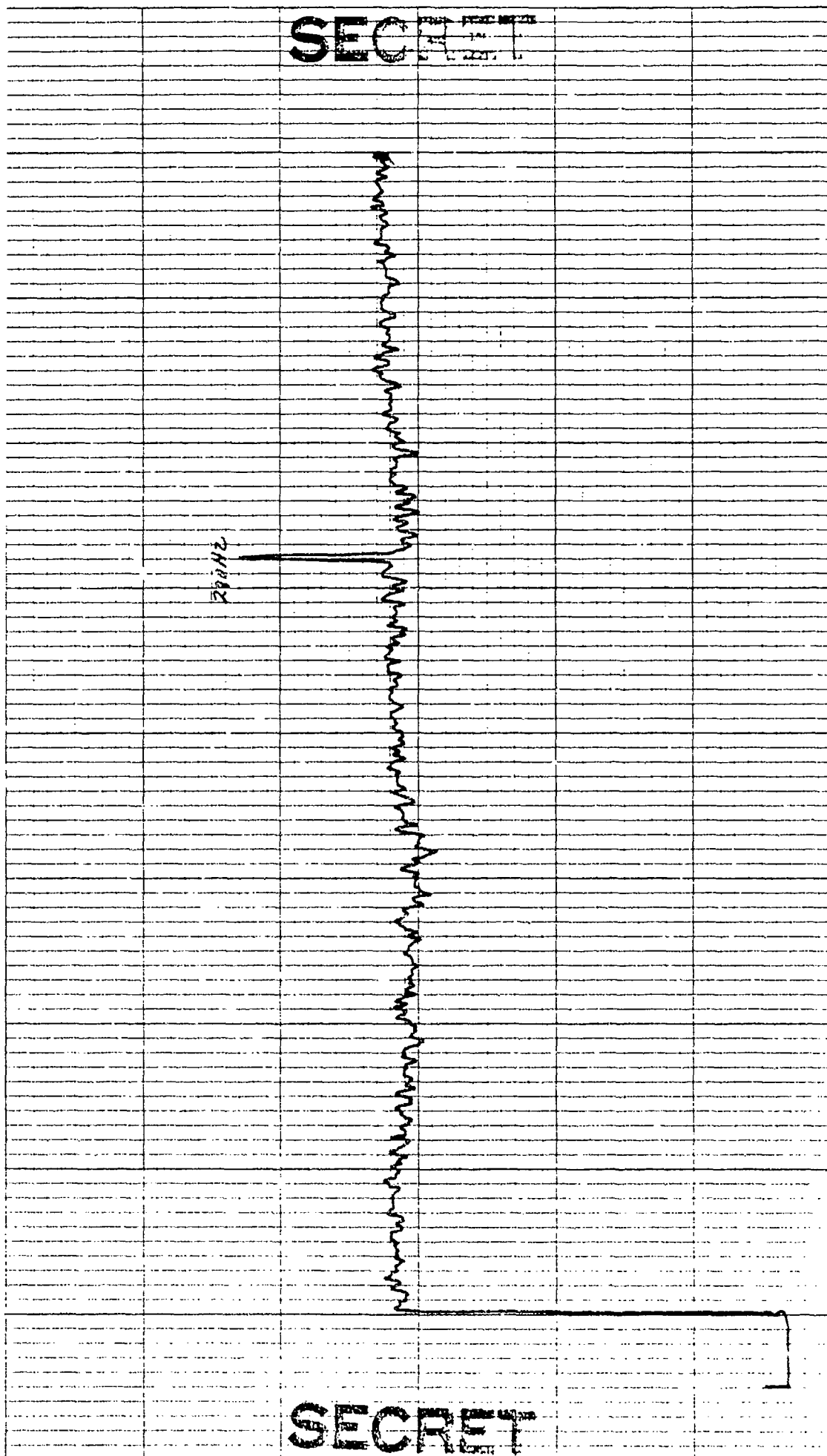
INTEGRATION TIME 320 SECS
ATTEN: DB
FILTER WTC: HANNING



15 X 10 TO THE INCHES
KEUFFEL & ESSER CO. MADE IN U.S.A.

46 0703

CONTROL: 3-14 -0633 (9) DATE OF ANALYSIS: REEL: 119 INDEX: 127
OMNI SPECTRUM (ELEMENT 18)
EXERCISE: BEARING STAKE
CENTER FREQ: 290 HZ
INTEGRATION TIME 320 SECS ATTN: ~ DB
FILTER WTC: HANNING
DATE/TIME: 3-16-77 -0633 Z
ANALYSIS BANDWIDTH: 1/10 HZ
DEG AZ STEERING



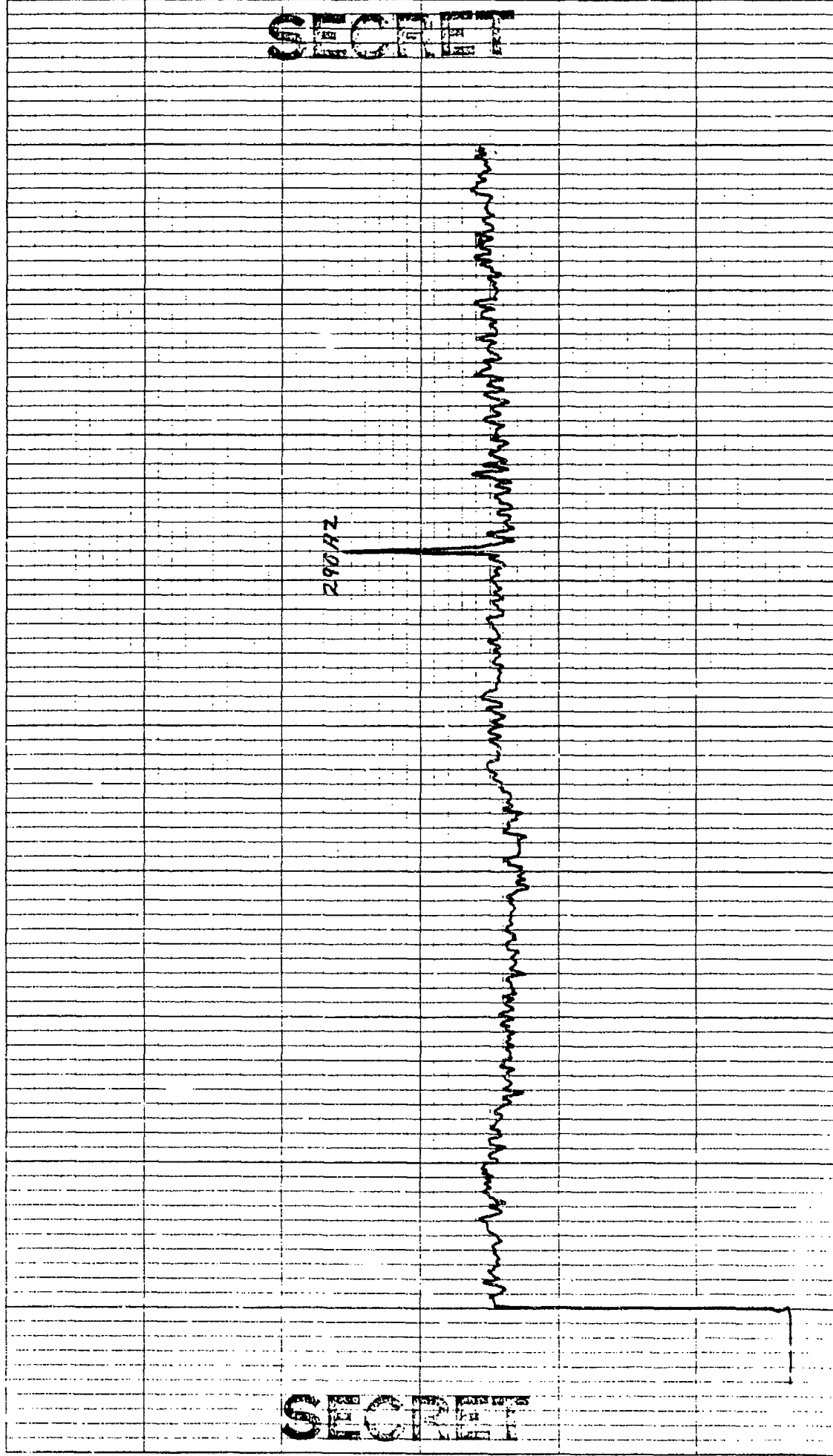
CONTROL: 3-6-0633 (16)
OMNI SPECTRUM (ELEMENT 20)
EXERCISE: BEARING STAKE
CENTER FREQ: 200 HZ
1 ELEMENT

DATE OF ANALYSIS:

DATE/TIME: 3-6-77 - 0633 Z
ANALYSIS BANDWIDTH: 1/10 HZ
— DEG AZ STEERING

REEL: M19 INDEX: 1637

INTEGRATION TIME 320 SECS
ATTN: — DB
FILTER WTG: HANNING



K&E 10 X 10 TO THE INCH • 7 X 10 INCHES
NEUFEL & ESSER CO. MADE IN U.S.A.

46 0703

CONTROL: 3-14 - 0623 (11)
OMNI SPECTRUM (ELEMENT 22)
EXERCISE: BEARING STAKE
CENTER FREQ: 286 HZ
1 ELEMENT

DATE OF ANALYSIS:

DATE/TIME: 3-6-77 - 0623 Z

ANALYSIS BANDWIDTH: 1/10 HZ
_____ DEG AZ STEERING

REEL: 119

INDEX: 1637

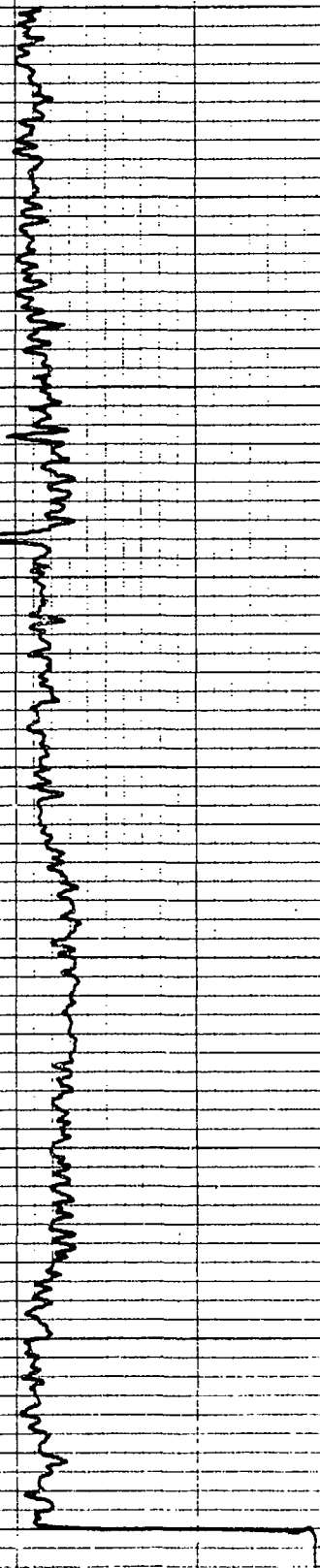
INTEGRATION TIME 320 SECS
FILTER

ATTN: DB
WTG: HANNING

SECRET

SECRET

280 HZ



K-E 10 X 10 TO THE INCH • 7 X 10 INCHES
KEUFFEL & ESSER CO. MADE IN U.S.A.

46 0703

CONTROL: 3-6 -0633 (12) DATE OF ANALYSIS: REEL: H19 INDEX: 1637
OMNI SPECTRUM(ELEMENT 24)
EXERCISE: BEARING STAKE
CENTER FREQ: 280 HZ
1 ELEMENT
DATE/TIME: 3-6-77 -0633Z
ANALYSIS BANDWIDTH: 1/10 HZ
INTEGRATION TIME 320 SECS
ATTEN: - DB
FILTER WTG: HANNING
DEG AZ STEERING

SECRET

290 HZ

SECRET

K.E. 10 X 10 TO THE INCH • 7 X 10 INCHES
KEUFFEL & ESSER CO. MADE IN U.S.A.

46 0703

CONTROL: 3-16-0633 (13)
OMNI SPECTRUM (ELEMENT 26)
EXERCISE: BEARING STAKE
CENTER FREQ: 280 HZ
1 ELEMENT

DATE OF ANALYSIS:

DATE/TIME: 3-16-77 - 0633 Z

ANALYSIS BANDWIDTH: 1/10 HZ
— DEG AZ STEERING

REEL: M19

INDEX 1637

INTEGRATION TIME 320 SECS
FILTER
ATTN: — DB
WTC: HANNING

SECRET

29972

SECRET

K&E 10 X 10 TO THE INCH • 7 X 10 INCHES
KEUFFEL & ESSER CO. MADE IN U.S.A.

46 0703

CONTROL: 3-16 - 0633 (14)
OMNI SPECTRUM (ELEMENT 29)
EXERCISE: BEARING STAKE
CENTER FREQ: 280 HZ
1 ELEMENT

DATE OF ANALYSIS:

DATE/TIME: 3-16-77 - 0633Z

ANALYSIS BANDWIDTH: 1/10HZ
— DEC AZ STEERING

REEL: H19

INTEGRATION TIME 320 SECS
FILTER

INDEX: 137

ATTN: DB
WTG: HANNING

SECRET

SECRET

280 HZ



KOE 10 X 10 TO THE INCH • 7 X 10 INCHES
KEUFFEL & ESSER CO. MADE IN U.S.A.

46 0703

CONTROL: 3-16-0633 (15)
OMNI SPECTRUM (ELEMENT 31)
EXERCISE: BEARING STAKE
CENTER FREQ: 281 HZ
1 ELEMENT

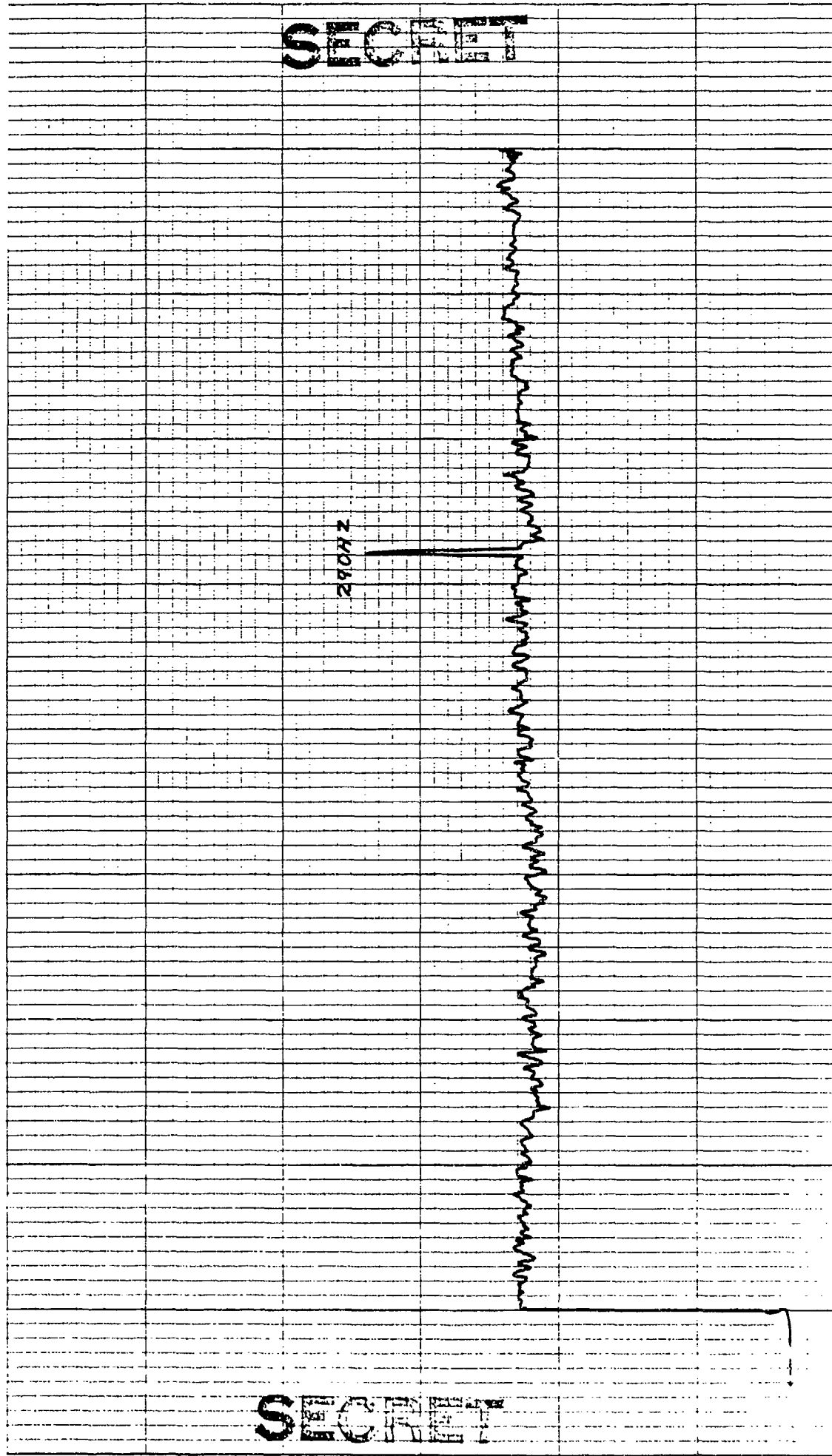
DATE OF ANALYSIS:

DATE/TIME: 3-16-77 - 0633Z
ANALYSIS BANDWIDTH: 1/10HZ
— DEG AZ STEERING

REEL: 419

INDEX/637

INTEGRATION TIME 320 SECS
FILTER WTG: HANNING
ATTEN: — DB



K-3 10 X 10 TO THE INCH • 7 X 10 INCHES
KEUFFEL & ESSER CO. MADE IN U.S.A.

46 0703

CONTROL: 3-16 - 0623 (16)
OMNI SPECTRUM (ELEMENT 33)
EXERCISE: BEARING STAKE
CENTER FREQ: 280 HZ
1 ELEMENT

DATE OF ANALYSIS:

DATE/TIME: 3-16-77 - 0630 Z
ANALYSIS BANDWIDTH: 1/10 HZ
— DEC AZ STEERING

REEL: H19

INDEX: 437

INTEGRATION TIME 320 SECS
ATTEN: — DB
FILTER WTG: HANNING

SECRET

290HZ

SECRET

10 X 10 TO THE INCH - 7 X 10 INCHES
KEUFFEL & ESSER CO. MADE IN U.S.A.

46 0703

CONTROL: 3-76 -0633 (17)
OMNI SPECTRUM(ELEMENT 35)
EXERCISE: BEARING STAKE
CENTER FREQ: 280 HZ
1 ELEMENT

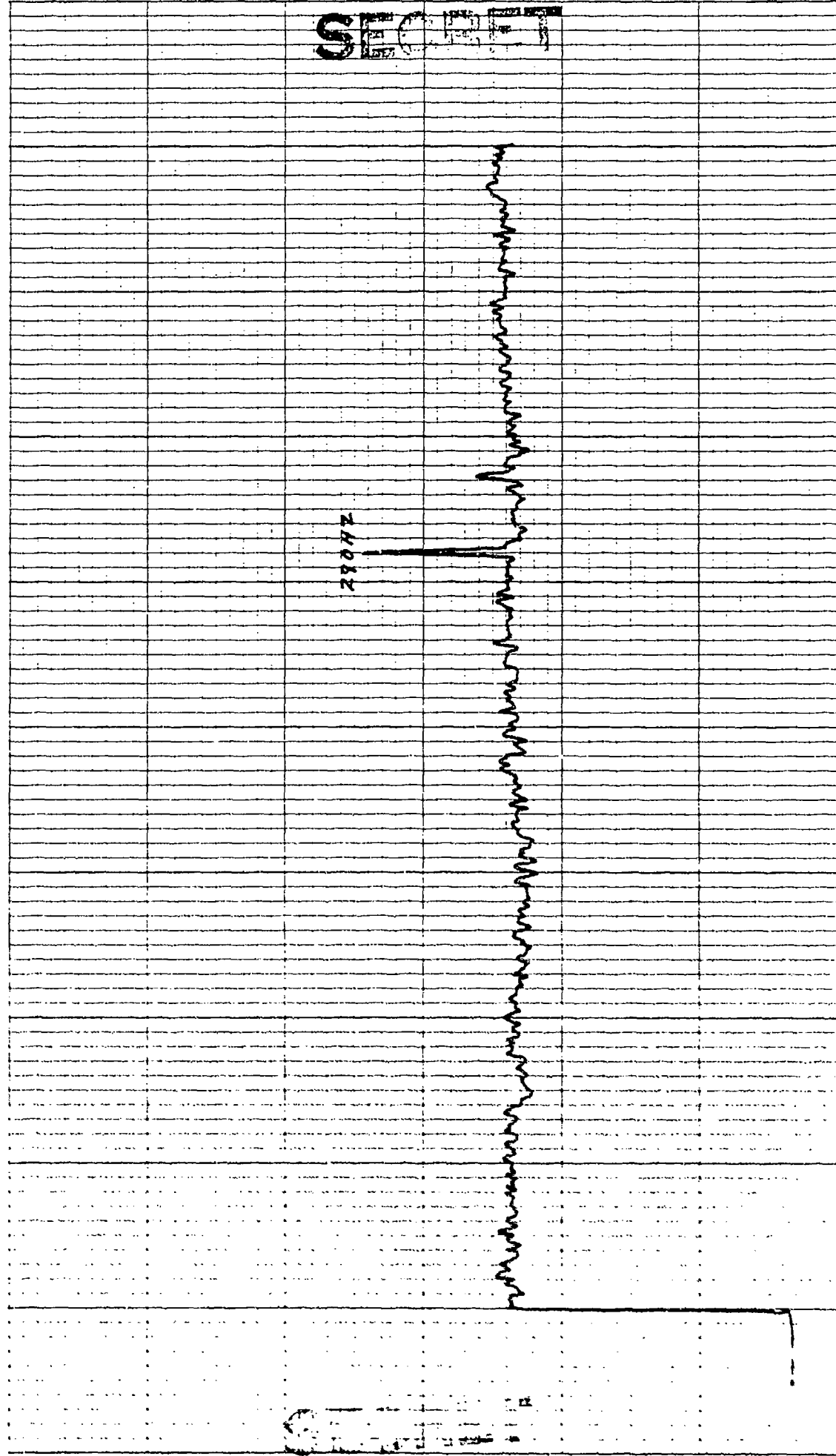
DATE OF ANALYSIS:

DATE/TIME: 3-16-77 -0633Z

ANALYSIS BANDWIDTH: 1/10HZ
— DEG AZ STEERING

REEL: M19 INDEX: 1637

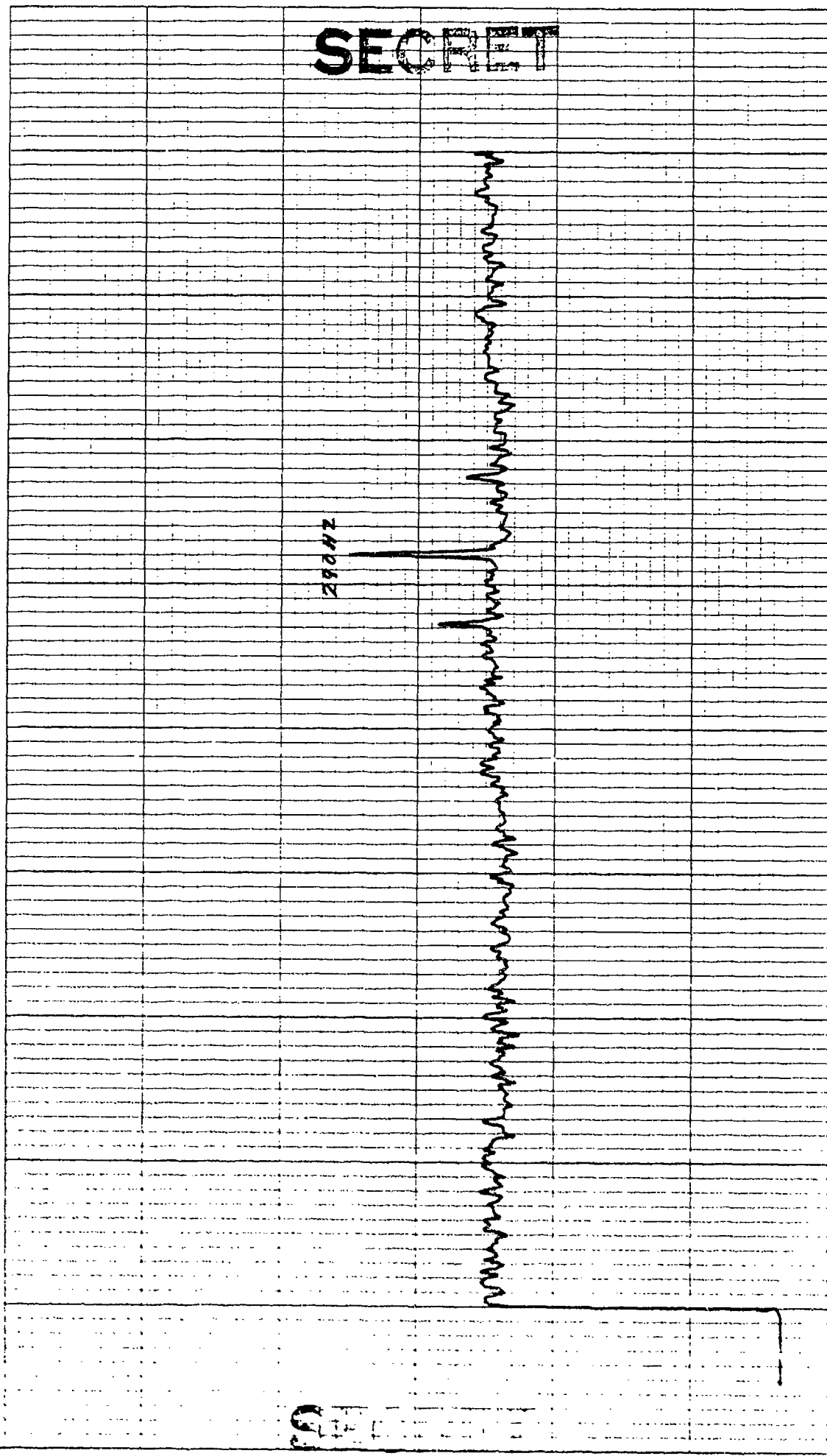
INTEGRATION TIME 320 SECS
ATTEN: — DB
FILTER, WTG: HANNING



K02 10 X 10 TO THE INCH. X 10 INCHES
REDFIELD & LINSER CO. MILWAUKEE, WIS.

46 0703

CONTROL: 3-16 - 0633 (18) DATE OF ANALYSIS: REEL: M19 INDEX: 1637
OMNI SPECTRUM (ELEMENT 37)
EXERCISE: BEARING STAKE
CENTER FREQ: 280 HZ INTEGRATION TIME 320 SECS ATTN: - DB
1 ELEMENT --- DEG AZ STEERING FILTER WTG: HANNING



KOE 10 X 10 TO THE INCH • 7 X 10 INCHES
KEUFFEL & ESSER CO. MADE IN U.S.A.

46 0703

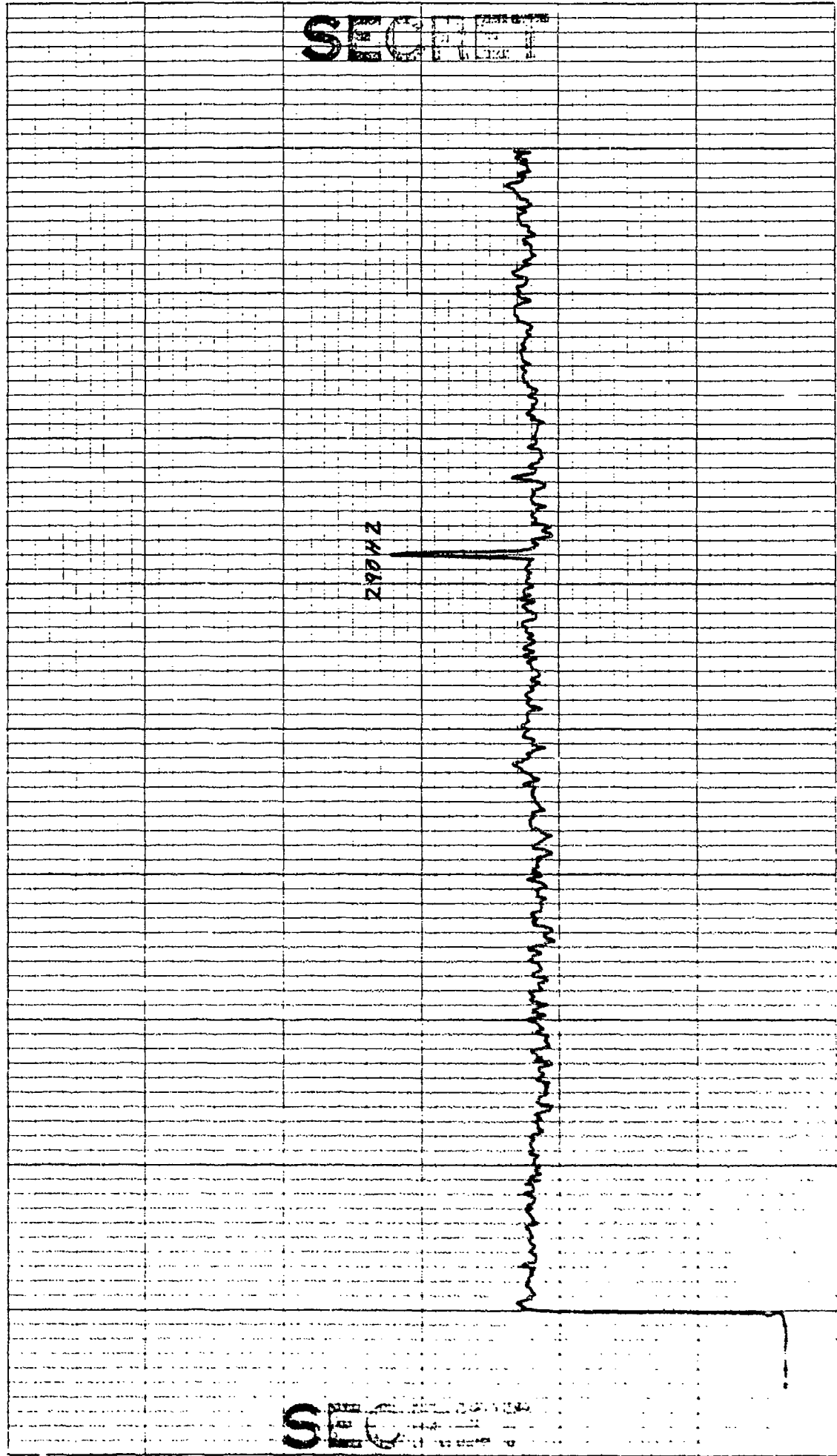
CONTROL: 3-16 -0633 (19)
OMNI SPECTRUM(ELEMENT 39)
EXERCISE: BEARING STAKE
CENTER FREQ: 280 HZ
1 ELEMENT

DATE OF ANALYSIS:

DATE/TIME: 3-16-77 -0633 Z
ANALYSIS BANDWIDTH: 1/10HZ
— DEG AZ STEERING

REEL: H19 INDEX/637

INTEGRATION TIME 320 SECS ATTN: — DB
FILTER WTG: HANNING



NOE 10 X 10 TO THE INCH • 7 X 10 INCHES
PERMUTEL & POWER CO. MADE IN U.S.A.

46 0703

CONTROL: 376 - 0637 (20)
OMNI SPECTRUM (ELEMENT 41)
EXERCISE: BEARING STAKE
CENTER FREQ: 280 HZ
1 ELEMENT

DATE OF ANALYSIS:

DATE/TIME: 3-16-77 - 0637 Z
ANALYSIS BANDWIDTH: 1/10 HZ
— DEC AZ STEERING

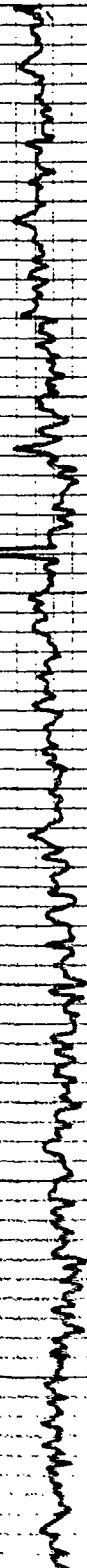
REEL: H19 INDEX: 1637

INTEGRATION TIME 320 SECS
ATTEN: — DB
FILTER WTG: HANNING

SECRET

280000

SECRET



10 X 10 TO THE INCHES
KUMHIL & PESSER CO. MADE IN U.S.A.

46 0703

CONTROL: 3-16 - 0633 (21)
OMNI SPECTRUM (ELEMENT 43)
EXERCISE: BEARING STAKE
CENTER FREQ: 280 HZ
1 ELEMENT

DATE OF ANALYSIS:

DATE/TIME: 3-6-77 - 0633 Z
ANALYSIS BANDWIDTH: 1/10 HZ
DEG AZ STEERING

REEL: M19 INDEX: 1637

INTEGRATION TIME 320 SECS
ATTEN: DB
FILTER WTC: HANNING

SECRET

SECRET

280 HZ



160E 10.8 TO 10.9 THE INCHES 2 IN. 10.8 TO 10.9

46 0703

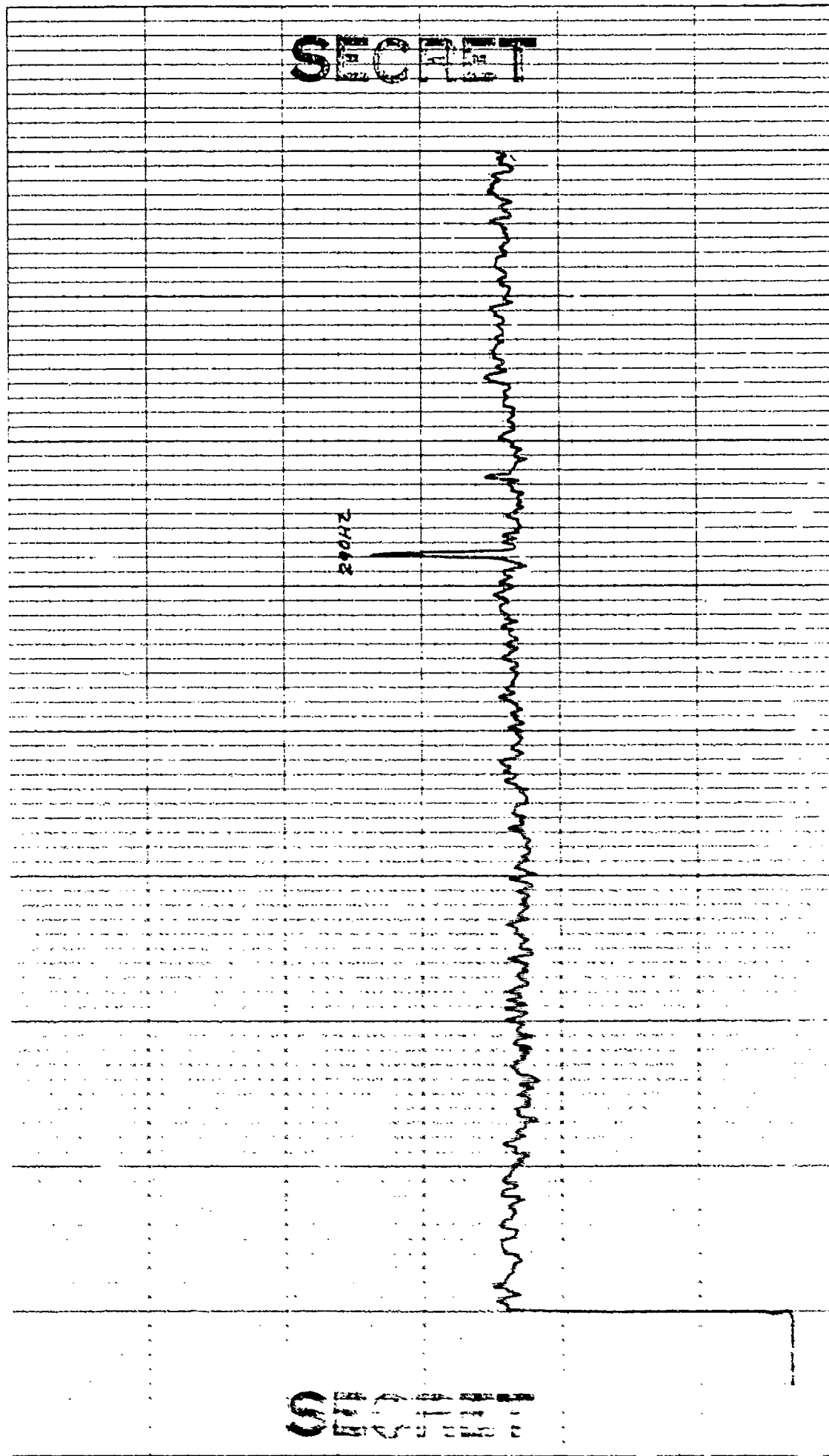
CONTROL: Q033-49 (0P10)
OMNI SPECTRUM(ELEMENT 45)
EXERCISE: BEARING STAKE
CENTER FREQ: 280 HZ
1 ELEMENT

DATE OF ANALYSIS:

DATE/TIME: 3-6-77 -0633 Z
ANALYSIS BANDWIDTH: 1/10HZ
DEG AZ STEERING

REEL: M19 INDEX/437

INTEGRATION TIME 320 SECS
ATTN: - DB
FILTER WTG: HANNING



K-2 10 X 10 TO THE INCH • 7 X 10 PER INCH
KEUFFEL & ESSER CO. MADE IN U.S.A.

46 0703

CONTROL: 3-16 -0633 (23)
OMNI SPECTRUM (ELEMENT 47)
EXERCISE: BEARING STAKE
CENTER FREQ: 280 HZ
1 ELEMENT

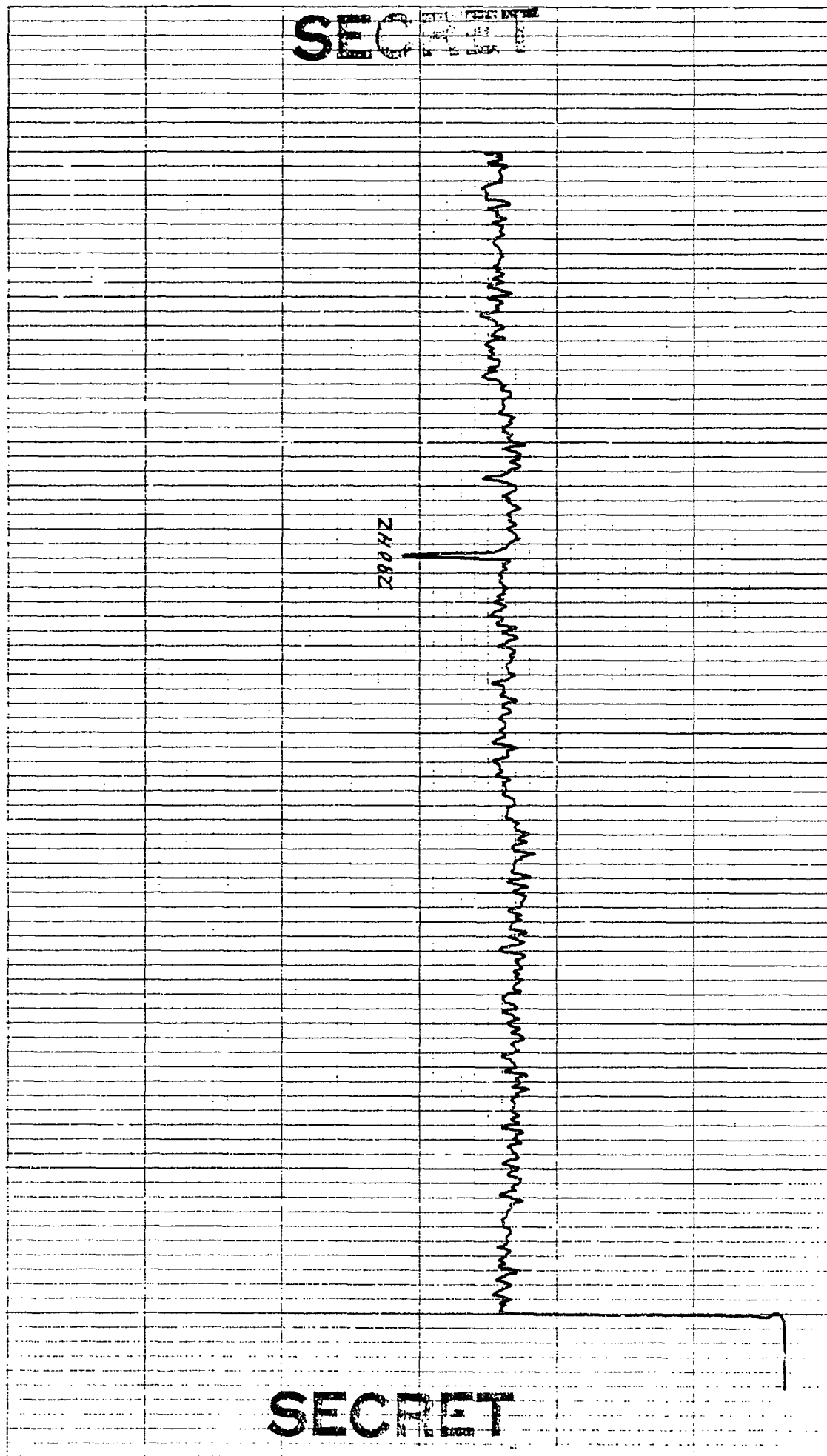
DATE OF ANALYSIS:

DATE/TIME: 3-16-77 -0633 Z

ANALYSIS BANDWIDTH: 1/10 HZ
— DEG AZ STEERING

REEL: M19 INDEX: 1637

INTEGRATION TIME 320 SECS ATTN: DB
FILTER WTG: HANNING



K-2 10 X 10 TO THE INCH • 7 X 10 INCHES
KEUFFEL & ESSER CO. MADE IN U.S.A.

46 0703

CONTROL: 3-16-0633 (24)
OMNI SPECTRUM (ELEMENT 49)
EXERCISE: BEARING STAKE
CENTER FREQ: 280 HZ
1 ELEMENT

DATE OF ANALYSIS:

DATE/TIME: 3-16-77 -0633 Z
ANALYSIS BANDWIDTH: 1/10 HZ
1 DEG AZ STEERING

REEL: H.9

INDEX 637

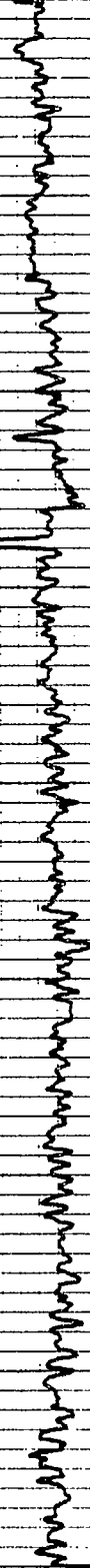
INTEGRATION TIME 320 SECS
FILTER

ATTEN: - DB
WTG: HANNING

SECRET

SECRET

29042



10 X 10 TO THE INCH • 7 X 10 INCHES
KEUFFEL & ESSER CO. MADE IN U.S.A.

46 0703

CONTROL: 3-16-0633 (25)
OMNI SPECTRUM (ELEMENT 51)
EXERCISE: BEARING STAKE
CENTER FREQ: 280 HZ
1 ELEMENT

DATE OF ANALYSIS:

DATE/TIME: 3-16-77 - 0633 Z
ANALYSIS BANDWIDTH: 1/10 HZ
1 DEG AZ STEERING

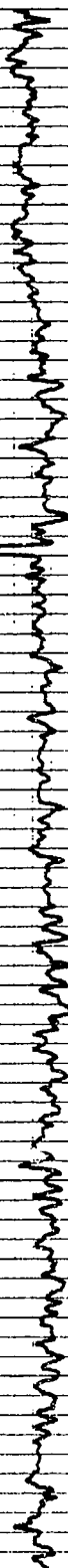
REEL: 119 INDEX: 1637

INTEGRATION TIME 320 SECS
FILTER WTG: HANNING

SECRET

SECRET

290 HZ



10 X 10 TO THE INCH • 7 X 10 INCHES
KEUFFEL & ESSER CO. MADE IN U.S.A.

46 0703

CONTROL: 3-16 -0633 (26)
OMNI SPECTRUM (ELEMENT 53)
EXERCISE: BEARING STAKE
CENTER FREQ: 280 HZ
1 ELEMENT

DATE OF ANALYSIS:

DATE/TIME: 3-16-77 -0633 Z
ANALYSIS BANDWIDTH: 1/10 HZ
— DEG AZ STEERING

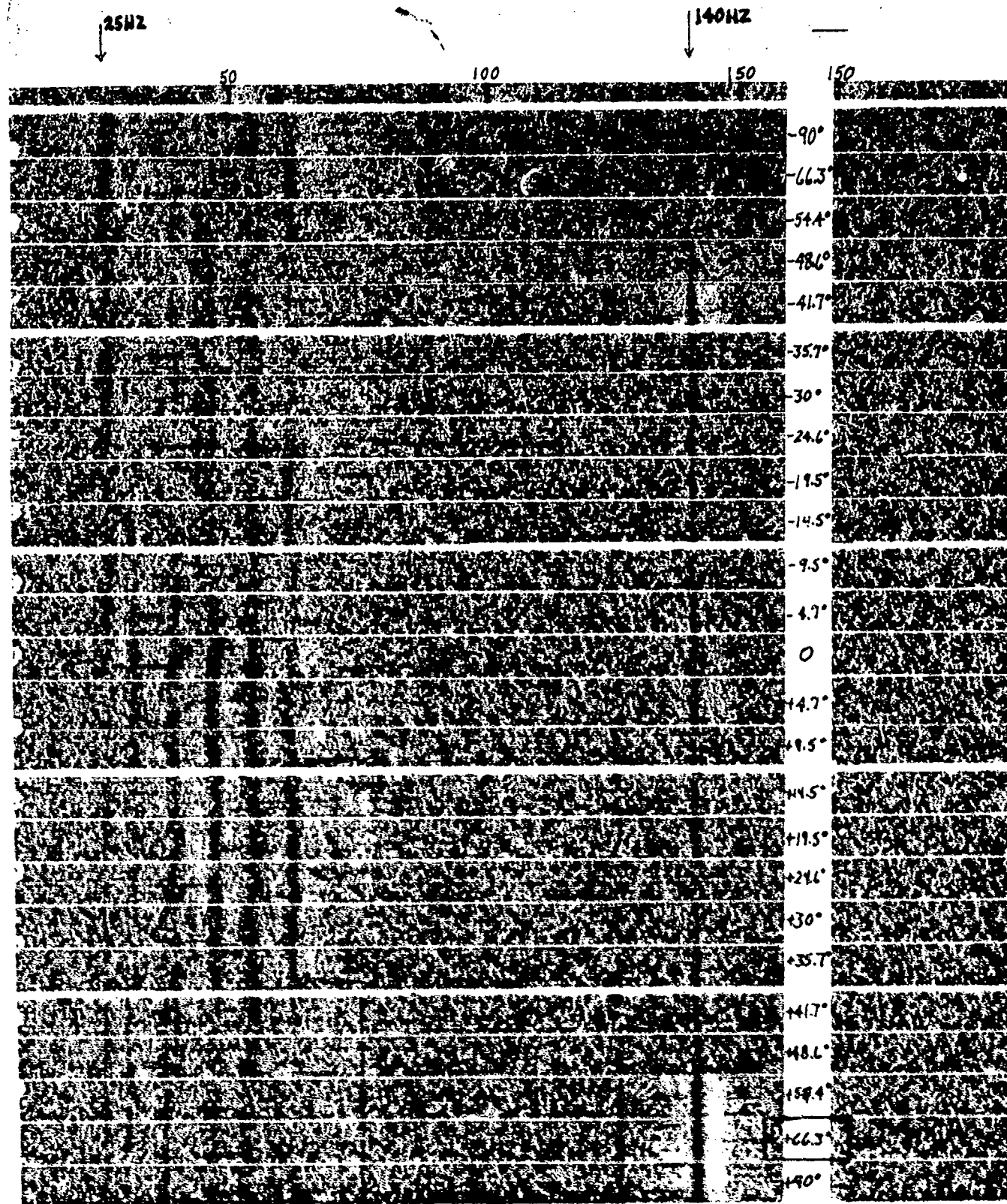
REEL: 119 INDEX: 637

INTEGRATION TIME 320 SECS
FILTER ATTN: — DB
WTG: HANNING

SECRET

290 HZ

SECRET



CONTROL NUMBER 06337-51-DPIC
 NUMBER OF ELEMENTS 25
 FREQUENCY BAND 10 TO 300 HZ
 RANGE 128 N.M.

HISTOGRAM
 TAPE REEL NUMBER M19
 ANALYSIS BAND WIDTH .2 HZ
 WATER DEPTH 2000 FMS

2

140HZ

SECRET

290HZ

295HZ

50

150

200

250

300

-90°

-66.3°

-54.4°

-48.6°

-41.7°

-35.7°

-30°

-24.6°

-19.5°

-14.5°

-9.5°

-4.7°

0

+4.7°

+9.5°

+14.5°

+19.5°

+24.6°

+30°

+35.7°

+41.7°

+48.6°

+54.4°

+66.3°

+90°

HISTORAZ

TAPE REEL NUMBER M19

TAPE COUNT 1637

SECRET

ANALYSIS BAND WIDTH .2 HZ

WATER DEPTH 2500 FMS

ELEMENT NUMBERS 1 TO 25 SAN-XXX-78-0140

EXERCISE: BEARING STAKE

CONFIDENTIAL

SIGNAL LEVEL AND SNR

CALCULATIONS

DATA POINT 10

FREQUENCY 140 HZ

NUMBER OF ELEMENTS 16

SIGNAL LEVEL

MCPS-32 SIGNAL LEVEL INDICATED	<u>-16.8</u>	
MCPS-32 CAL. CORRECTION	<u>+10</u>	-6.8
BEAMFORMER GAIN	<u>+12</u>	+5.2 SIG. LEVEL FOR SNR CALCULATION
MRA CORRECTION	<u>+ .2</u>	+5.4 SIG. LEVEL FOR SIGNAL GAIN

NOISE LEVEL

MCPS-32 SIGNAL LEVEL INDICATED	<u>-45.6</u>	
MCPS-32 CAL. CORRECTION	<u>+10</u>	-35.6
BEAMFORMER GAIN	<u>+12</u>	-23.6 NOISE LEVEL FOR SNR CALCULATION

SIGNAL-NOISE-RATIO

SIGNAL LEVEL FOR SNR	<u>+5.2</u>	
SIGNAL LEVEL FOR SNR	<u>-23.6</u>	28.8
PROCESSOR CORRECTION	<u>-4.0</u>	24.8
MRA CORRECTION	<u>+ .2</u>	25 SNR 1/10 HZ BAND
BANDWIDTH CONVERSION	<u>-8.2</u>	16.8 SNR 1 HZ BAND

CONFIDENTIAL

CONFIDENTIAL

SIGNAL LEVEL AND SNR
CALCULATIONS

DATA POINT 10

FREQUENCY 290 HZ

NUMBER OF ELEMENTS 16

SIGNAL LEVEL

MCPS-32 SIGNAL LEVEL INDICATED -35.8

MCPS-32 CAL. CORRECTION +10 -25.8

BEAMFORMER GAIN +12 -13.8 SIG. LEVEL FOR SNR CALCULATION

MRA CORRECTION + .8 -13.0 SIG. LEVEL FOR SIGNAL GAIN

NOISE LEVEL

MCPS-32 SIGNAL LEVEL INDICATED -59.4

MCPS-32 CAL. CORRECTION +10 -49.4

BEAMFORMER GAIN +12 -37.4 NOISE LEVEL FOR SNR CALCULATION

SIGNAL-NOISE-RATIO

SIGNAL LEVEL FOR SNR -13.8

SIGNAL LEVEL FOR SNR -37.4 23.6

PROCESSOR CORRECTION - 4.0 19.6

MRA CORRECTION + .8 20.4 SNR 1/10 HZ BAND

BANDWIDTH CONVERSION -8.2 12.2 SNR 1 HZ BAND

CONFIDENTIAL

DATA POINT 10SIGNAL GAIN

	<u>140 HZ</u>	<u>290HZ</u>	<u>295HZ</u>
MEAN OMNI SIGNAL LEVEL	<u>23.3</u>	<u>38.0</u>	<u> </u>
MRA SIGNAL LEVEL	<u>+ 5.4</u>	<u>-13.0</u>	<u> </u>
ARRAY SIGNAL GAIN	<u>28.7</u>	<u>25.0</u>	<u> </u>
20 LOG <u>16</u>	<u>24</u>	<u>24</u>	<u> </u>
# of elements			
DIFFERENCE	<u>+ 4.7</u>	<u>+1.0</u>	<u> </u>

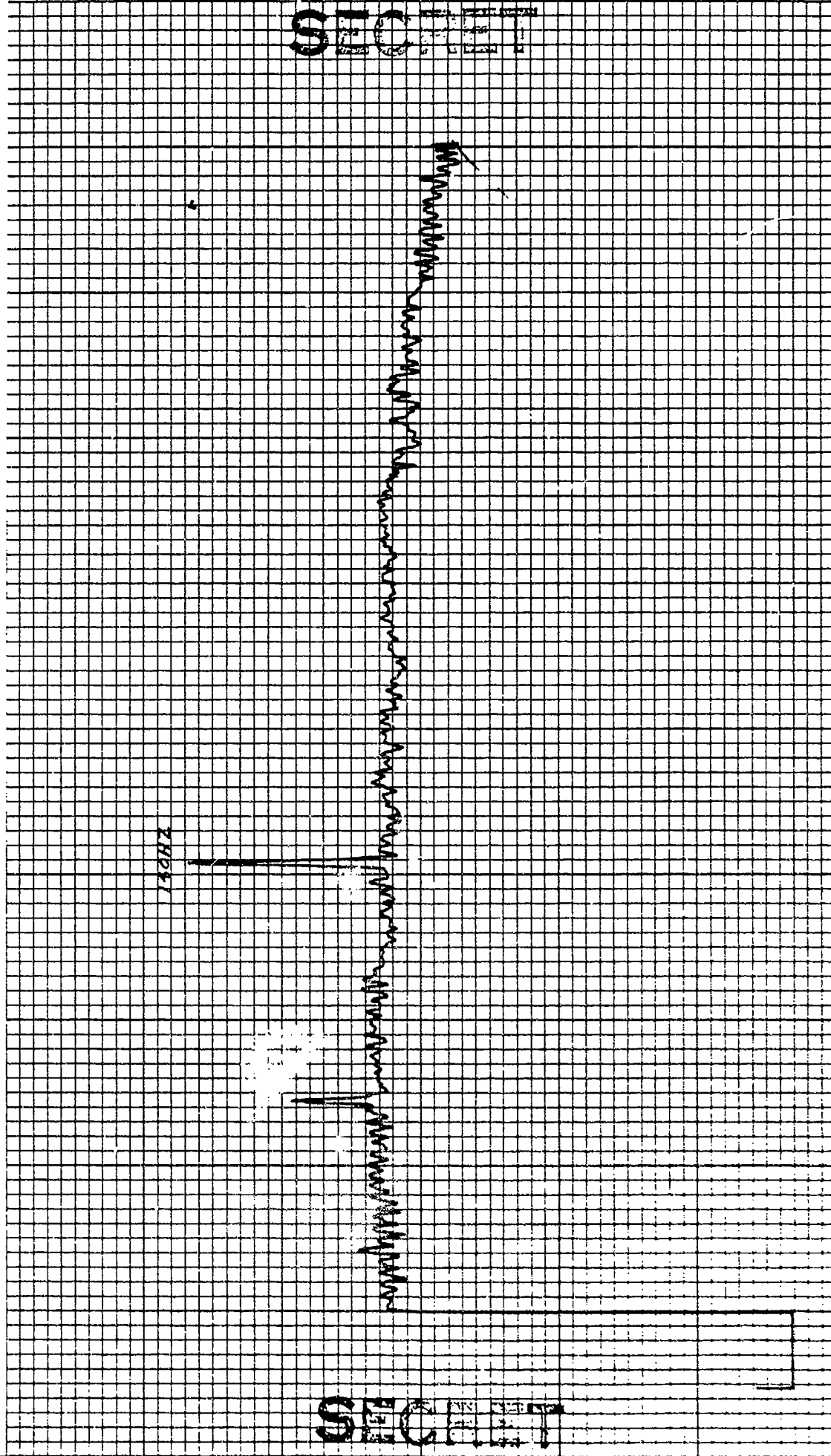
ARRAY GAIN

MRA SNR	<u>25.0</u>	<u>20.4</u>	<u> </u>
MEAN OMNI SNR	<u>18.7</u>	<u>9.4</u>	<u> </u>
ARRAY GAIN	<u>6.3</u>	<u>11.0</u>	<u> </u>
THEORETICAL AZMUTH GAIN (at MRA)	<u>7.7</u>	<u>10.1</u>	<u> </u>
DIFFERENCE	<u>- 1.4</u>	<u>+ .9</u>	<u> </u>

KOE 10 X 10 TO THE INCH • 7 X 10 INCHES
KEUFFEL & ESSER CO. MADE IN U.S.A.

46 0703

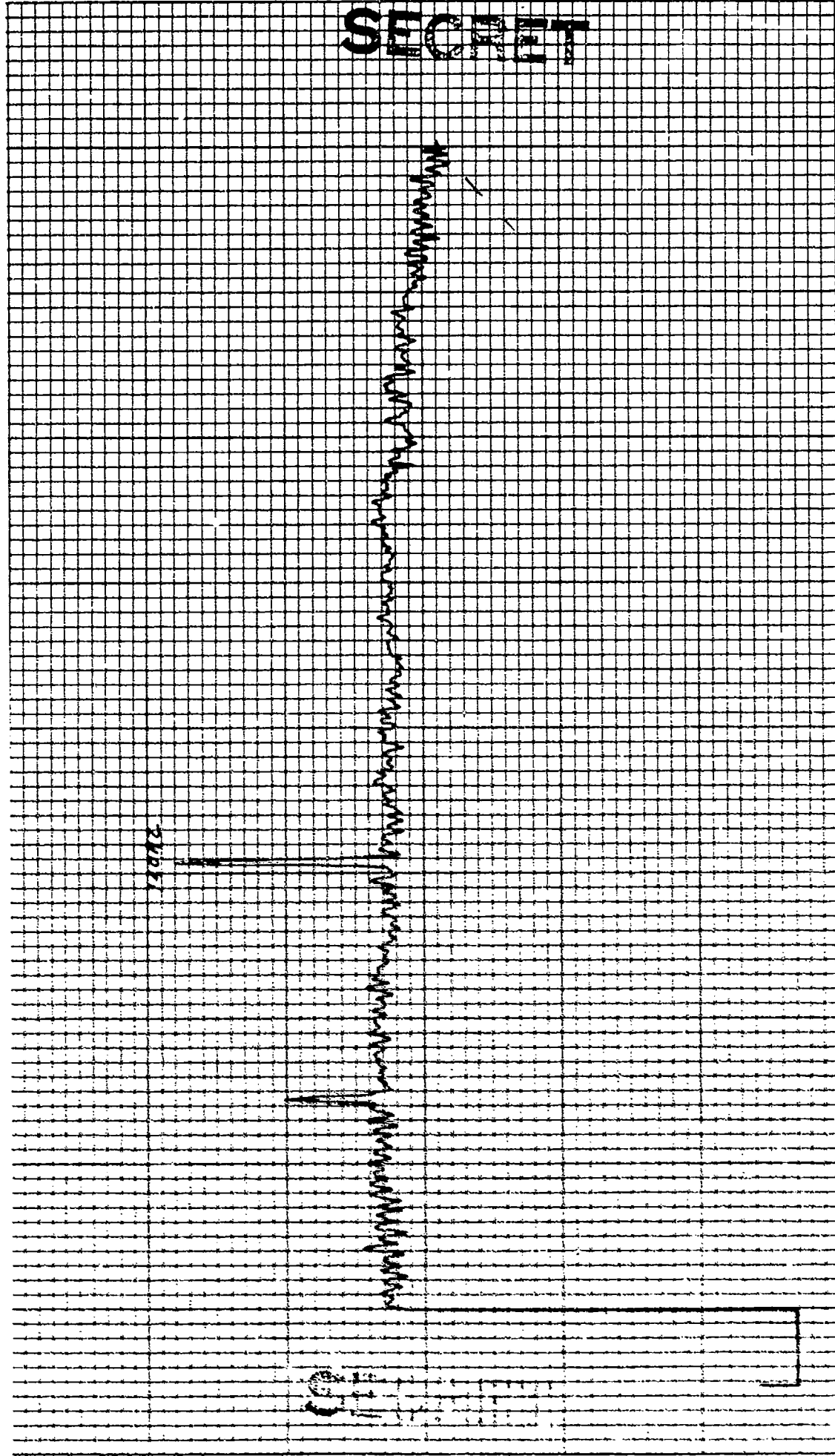
CONTROL: 0633 - 16 (DP10) REEL: 819 INDE X / 637
BEAMFORMED SPECTRUM (ELEMENTS) DATE OF ANALYSIS: 1-6 & 8-17
EXERCISE: BEARING STAKE DATE/TIME: 3-16-77 - 0633 Z INTEGRATION TIME 320 SECS ATTN: -72 DB
CENTER FREQ: 150 HZ ANALYSIS BANDWIDTH: 1/10 HZ FILTER WTG: HANNING
16 ELEMENTS +50 DEG. AZ STEERING



KOE 10 X 10 TO THE INCH • 7 X 10 INCHES
KELLY & ESSER CO. MADE IN U.S.A.

46 0703

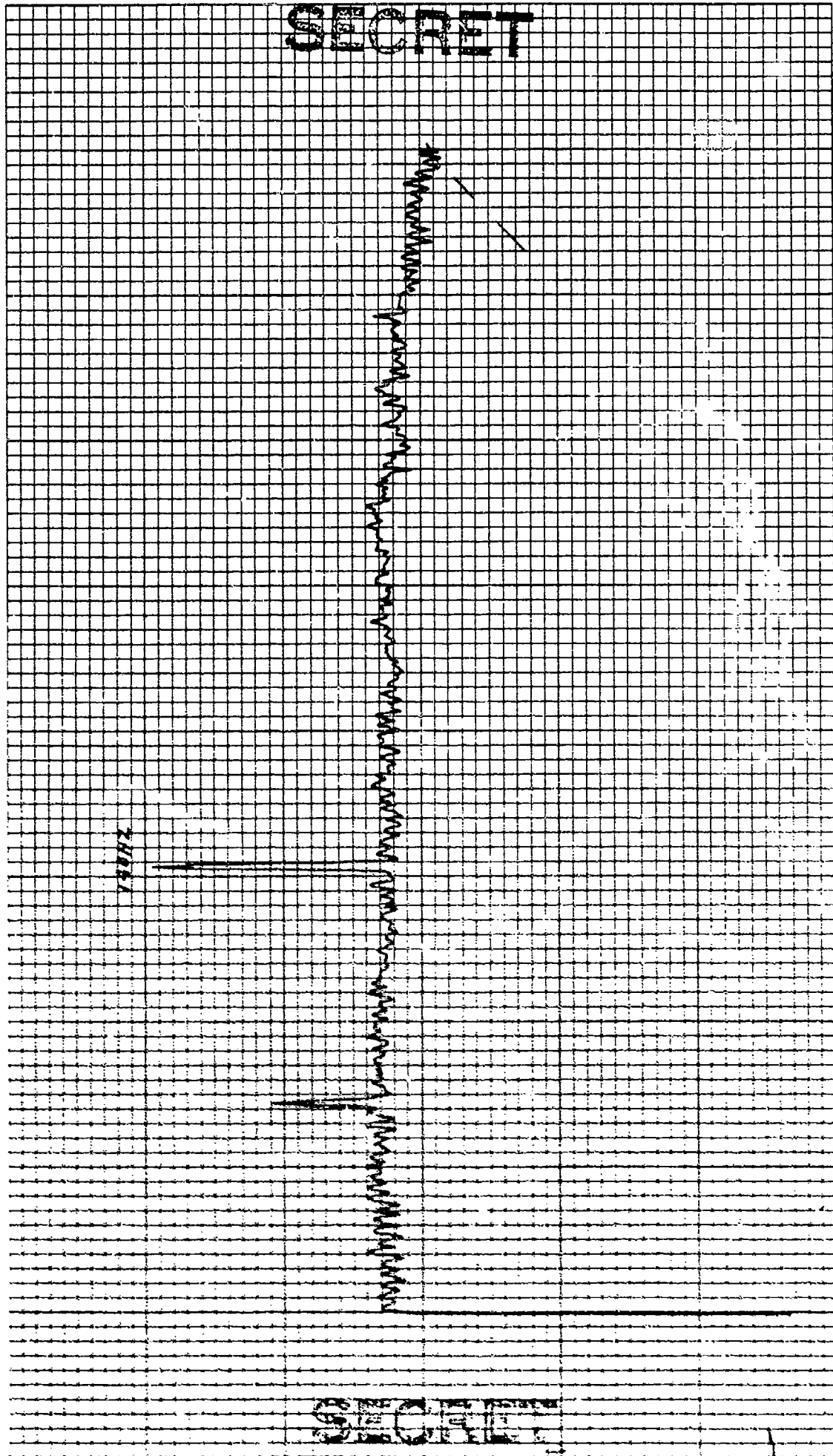
CONTROL: 0633 - 16 (DP10) DATE OF ANALYSIS: 1-6-77-0633Z REEL: M19 INDE X/637
BEAMFORMED SPECTRUM(ELEMENTS) DATE/TIME: 3-16-77-0633Z INTEGRATION TIME 320 SECS ATTN: -/2 DB
EXERCISE: BEARING STAKE ANALYSIS BANDWIDTH: 1/10HZ FILTER WTG: HANNING
CENTER FREQ: 150 HZ 52 DEG. AZ STEERING



K.E 10 X 10 TO THE INCH .7 X 10 INCHES
KELPHEL & ELSER CO. MADE IN U.S.A.

46 0703

CONTROL: 0633 - 16 (D910) DATE OF ANALYSIS: 1-6 & 9-17 REEL: 419 INDE X0633
BEAMFORMED SPECTRUM(ELEMENTS) DATE/TIME: 3-16-77 - 0633 Z INTEGRATION TIME 320 SECS ATTN: -12 DB
EXERCISE: BEARING STAKE ANALYSIS BANDWIDTH: 1/10HZ FILTER WTG: HANNING
CENTER FREQ: 150 HZ +54 DEG. AZ STEERING



K-E 10 X 10 TO THE INCH • 7 X 10 INCHES
KELPPEL & ASSOCIATES CO. MADE IN U.S.A.

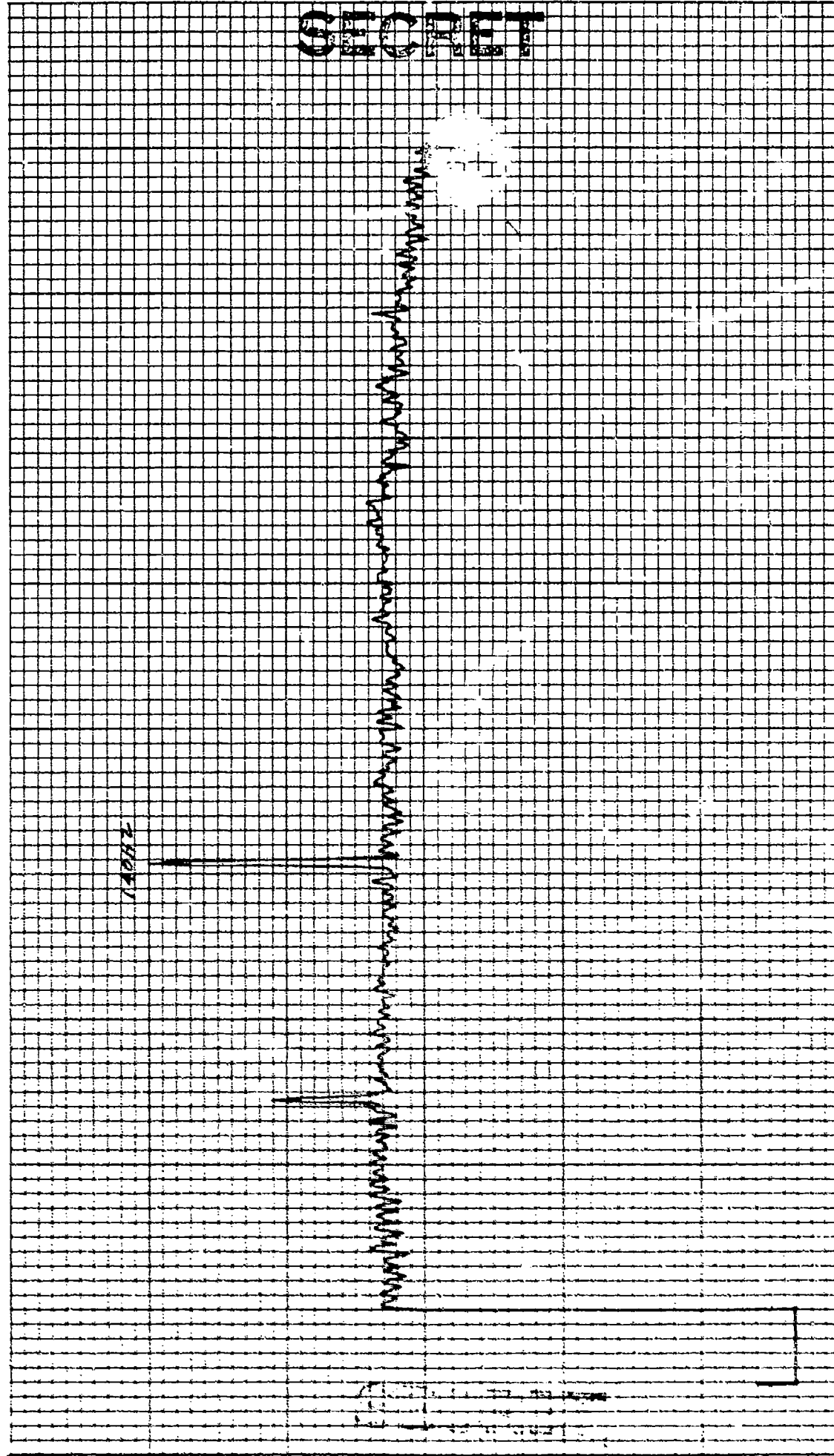
46 0703

CONTROL: 0613 - 16 (DP10)
BEAMFORMED SPECTRUM (ELEMENTS)
EXERCISE: BEARING STAKE
CENTER FREQ: 150 HZ
16 ELEMENTS

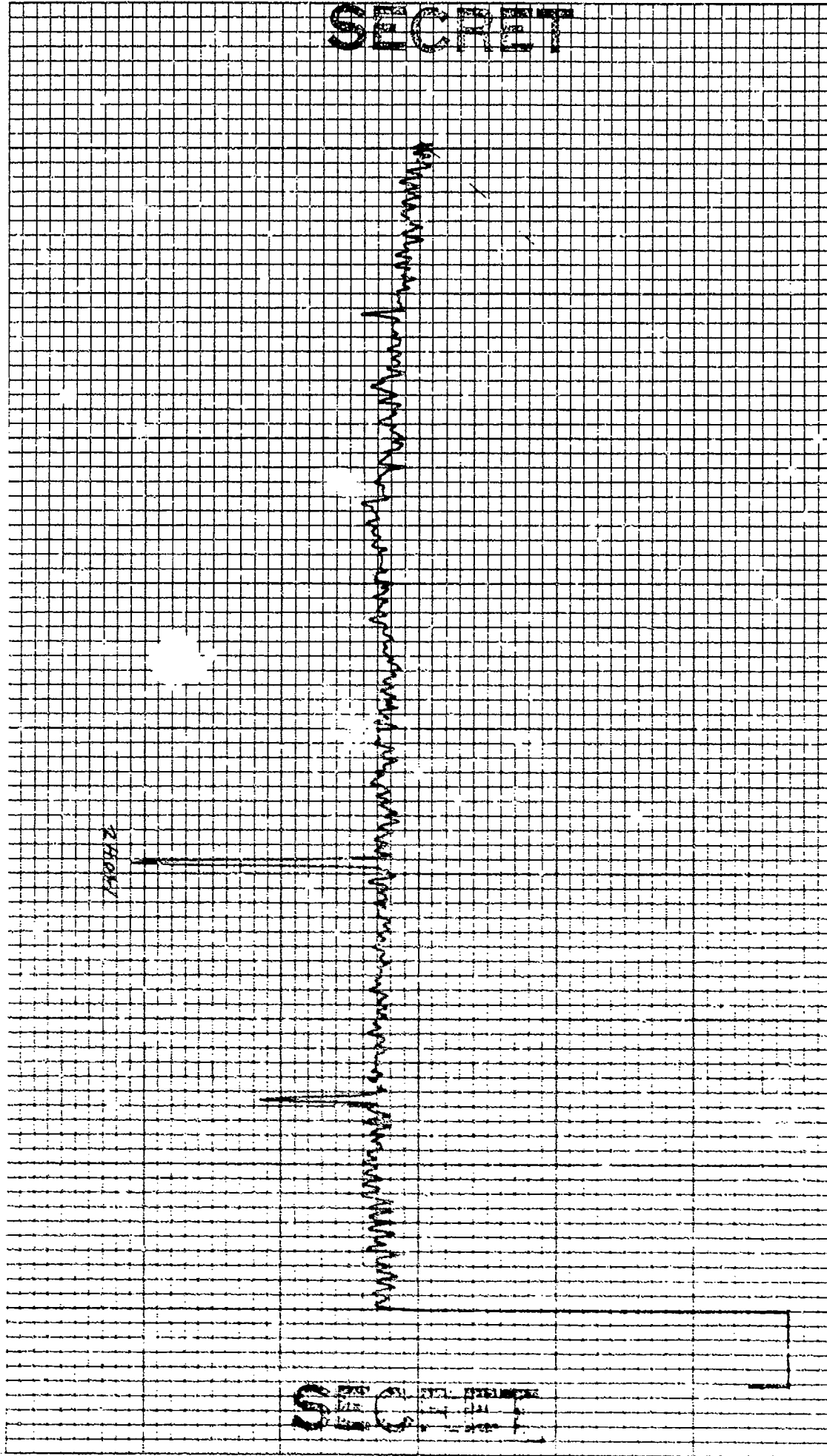
DATE OF ANALYSIS: - - - - -
1-6-8-17
DATE/TIME: 3-16-77 - 0633Z
ANALYSIS BANDWIDTH: 1/10HZ
156 DEG. AZ STEERING

REEL: 419
INTEGRATION TIME 320 SECS
FILTER
WTG: HANNING

INDE X 1637



CONTROL: 0633 - 16 (DP10) DATE OF ANALYSIS: 1-6-8-17 REEL: 419 INDEX: X/637
 BEAMFORMED SPECTRUM(ELEMENTS))
 EXERCISE: BEARING STAKE DATE/TIME: 3-16-17 - 0633 Z INTEGRATION TIME 320 SECS ATTN: -12 DB
 CENTER FREQ: 150 HZ ANALYSIS BANDWIDTH: 1/10 HZ FILTER WTC: HANNING
16 ELEMENTS +50 DEG. AZ STEERING

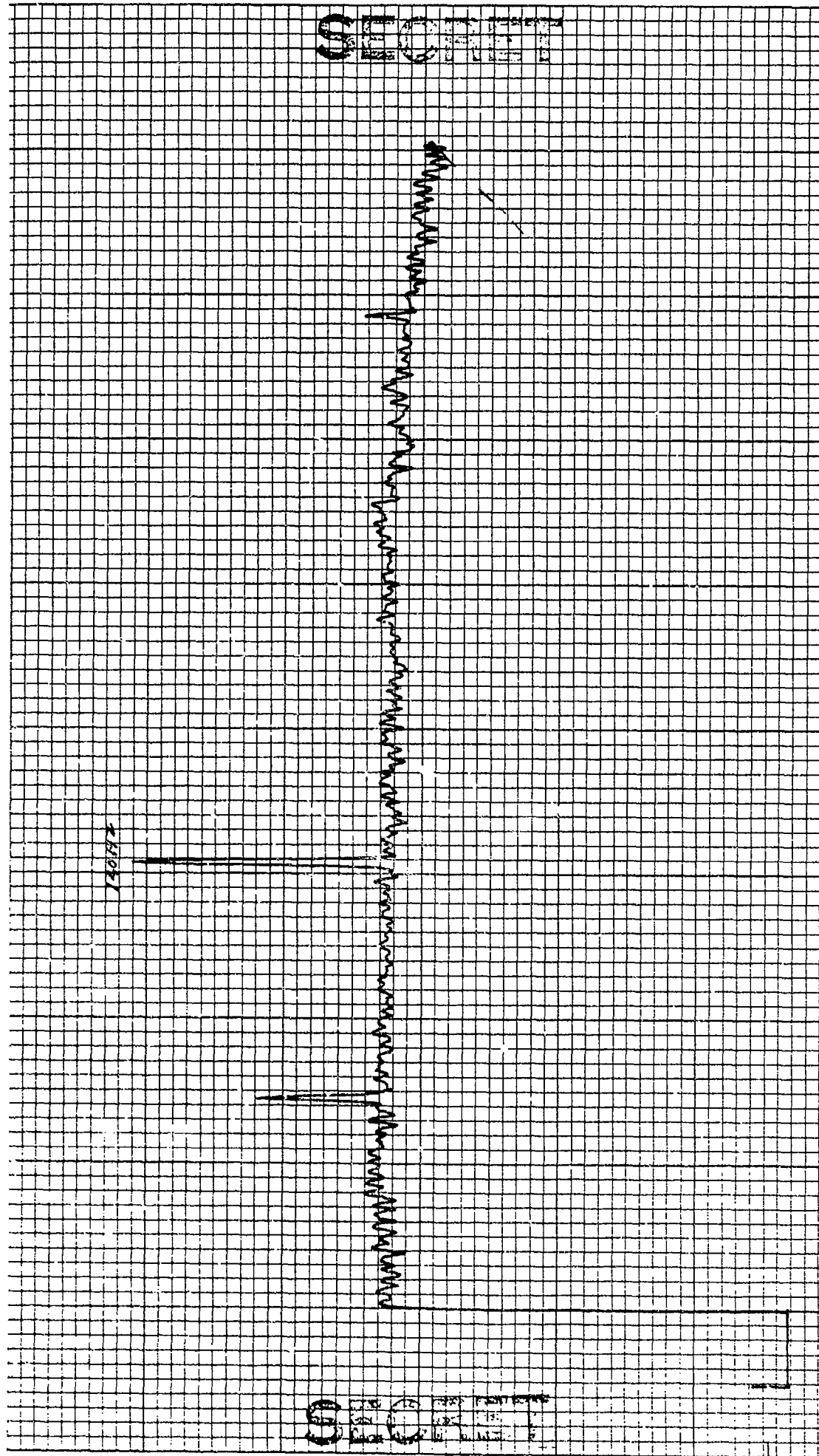


SECRET

KSE 10 X 10 TO THE 1/10 INCH 7 X 10 INCHES
KEUFFEL & ESSER CO. MADE IN U.S.A.

46 0703

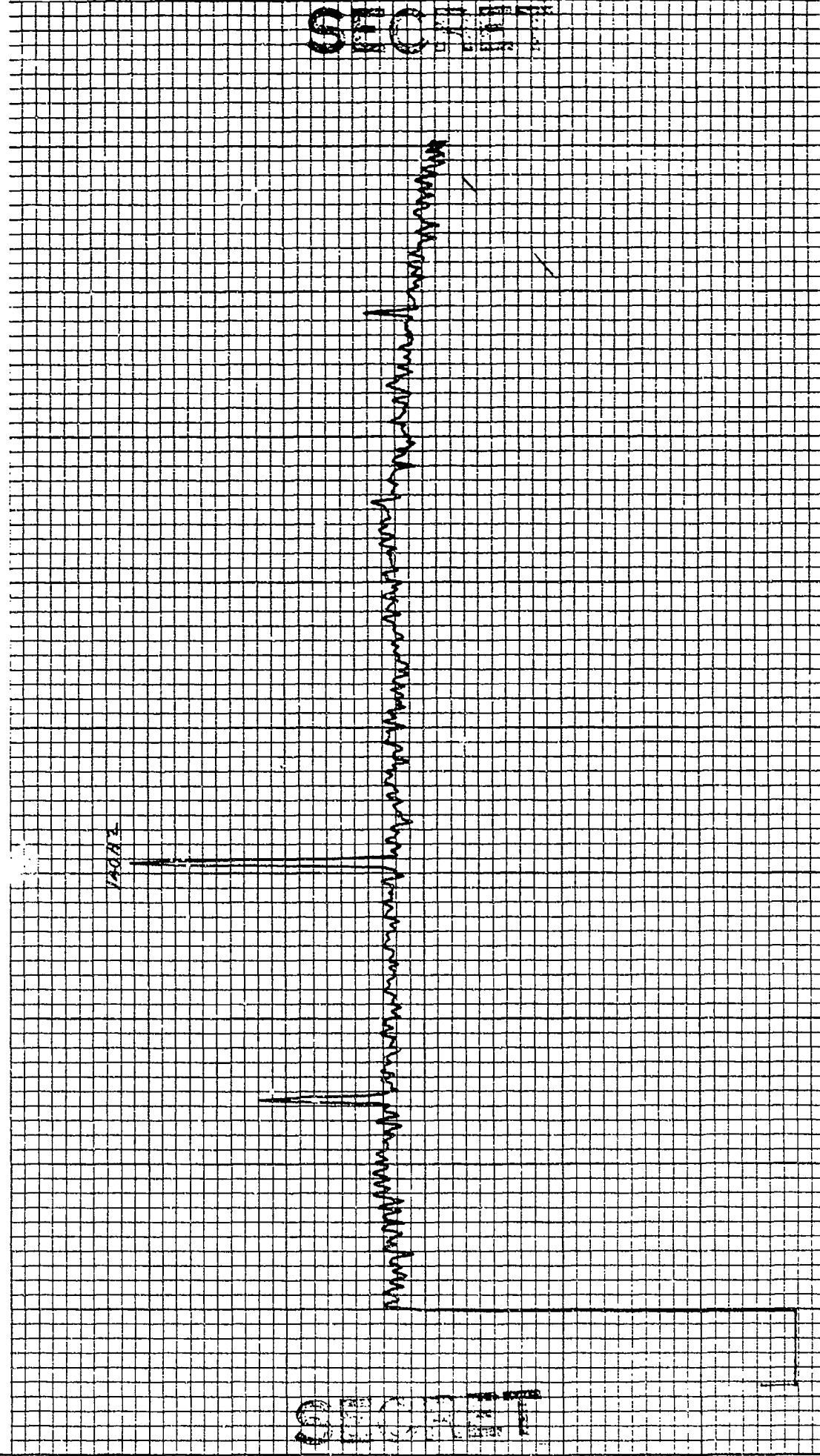
CONTROL: 0633 - 16 (LPI) DATE OF ANALYSIS: - - - -
REEL: 119 INDE X 637
EXERCISE: BEARING STAKE INTEGRATION TIME 320 SECS ATTN: -/2 DB
CENTER FREQ: 150 HZ FILTER WTG: HANNING
16 ELEMENTS ANALYSIS BANDWIDTH: 1/10 HZ
+60 DEG. AZ STEERING



K-E 10 X 10 TO THE INCH • 7 X 10 INCHES
KEUFFEL & ESSER CO. MADE IN U.S.A.

46 0703

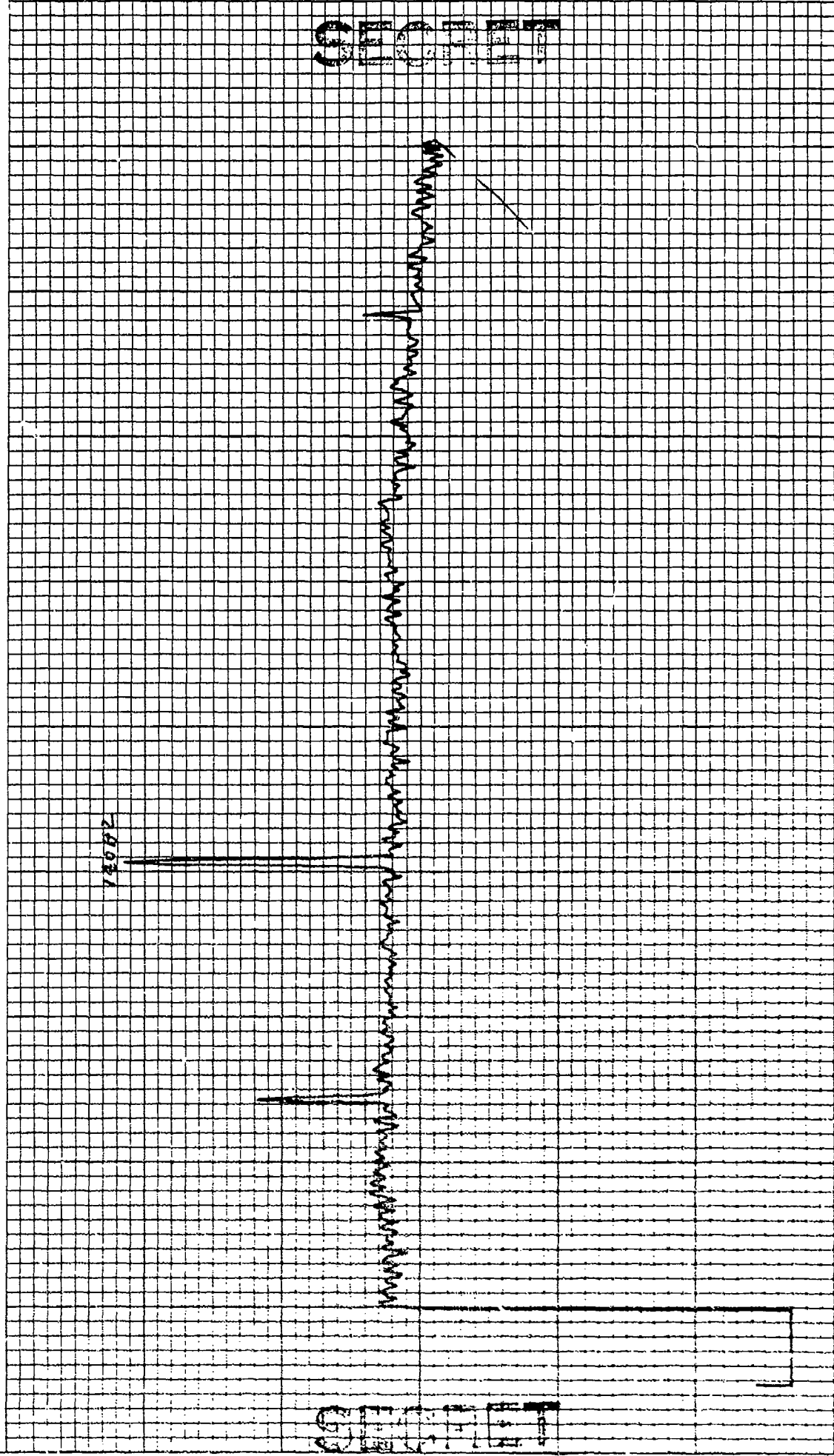
CONTROL: 0633 - 16 (D10) DATE OF ANALYSIS: 1-6-77 - 0633Z REEL: 119 INDE X/637
BEAMFORMED SPECTRUM (ELEMENTS) 1-6-77 - 17
EXERCISE: BEARING STAKE ANALYSIS BANDWIDTH: 1/10HZ
CENTER FREQ: 150 HZ 16 ELEMENTS + 62 DEG. AZ STEERING
INTEGRATION TIME 320 SECS FILTER WTG: HANNING ATTN: -12-DB



K+E 10 X 10 TO THE INCH • 7 X 10 INCHES
KEUFFEL & ESSER CO. MADE IN U.S.A.

46 0703

CONTROL: 0633 - 16 (DP10) DATE OF ANALYSIS: 1-6-78 REEL: 419 INDE X/637
BEAMFORMED SPECTRUM(ELEMENTS))
EXERCISE: BEARING STAKE DATE/TIME: 3-16-77 - 0633 Z INTEGRATION TIME 320 SECS ATTN: 72-DB
CENTER FREQ: 150 HZ ANALYSIS BANDWIDTH: 1/10 HZ FILTER WTG: HANNING
16 ELEMENTS +63 DEG. AZ STEERING



KSE 10 X 10 TO THE INCH • 7 X 10 INCHES
KEUFFEL & ESSER CO. MADE IN U.S.A.

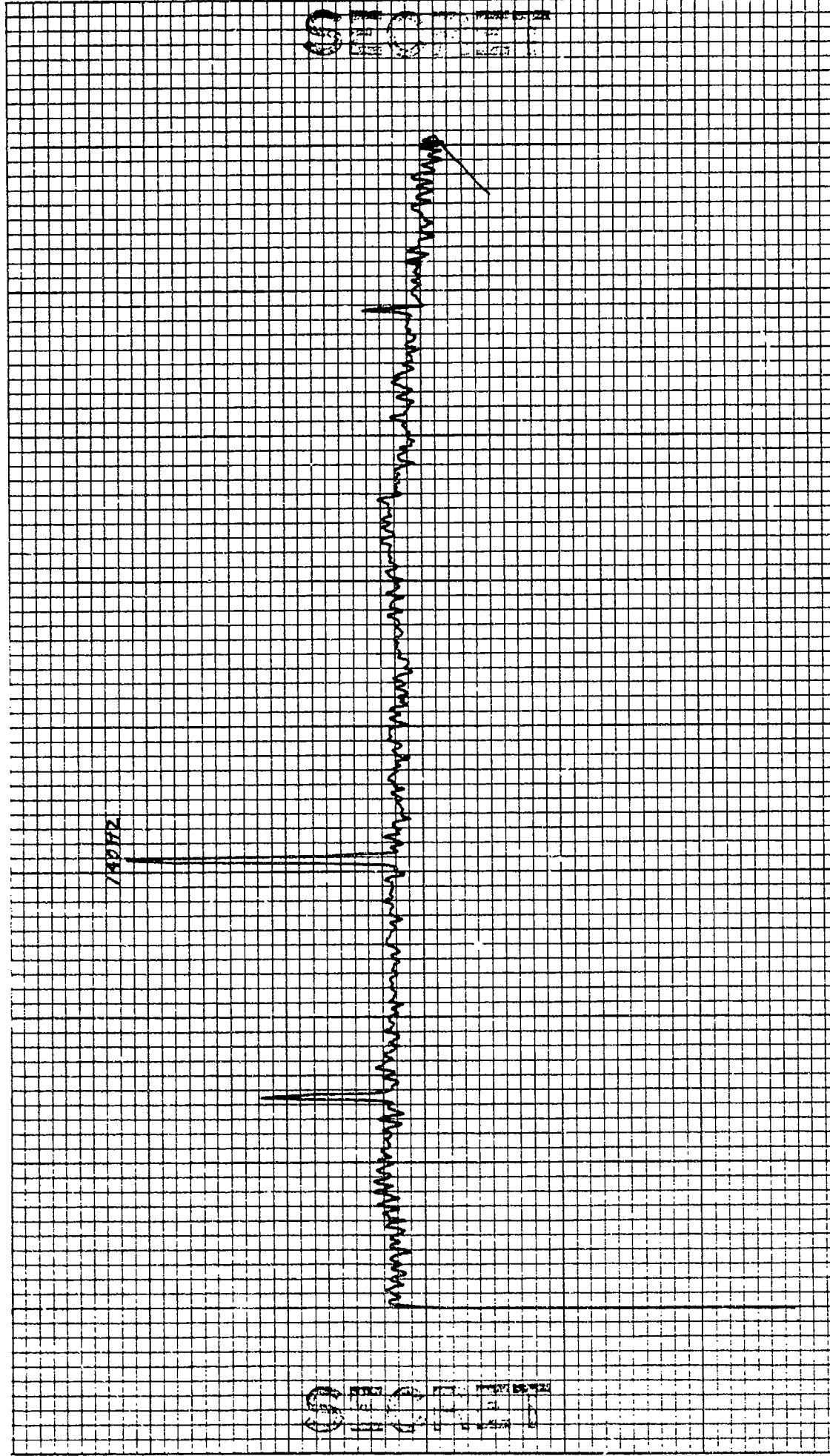
46 0703

CONTROL: 033-16 (DP10)
BEAMFORMED SPECTRUM (ELEMENTS)
EXERCISE: BEARING STAKE
CENTER FREQ: 150 HZ
16 ELEMENTS

DATE OF ANALYSIS: 1-6-79
DATE/TIME: 3-16-77 - 0333 Z
ANALYSIS BANDWIDTH: 1/10 HZ
162.5 DEG. AZ STEERING

REEL: 419
INTEGRATION TIME 320 SECS
FILTER

INDE X1637
ATTEN: 72-DB
WTG: HANNING



46 0703



NOTES

INDE X 1637

REEL: M19

DATE OF ANALYSIS: _____

CONTROL: 0633 - 49 (DP10)
BEAMFORMED SPECTRUM (ELEMENTS)

EXERCISE: BEARING STAKE

DATE/TIME: 3-16-77-0633 Z

DATE/TIME: 3-16-77-0633 Z

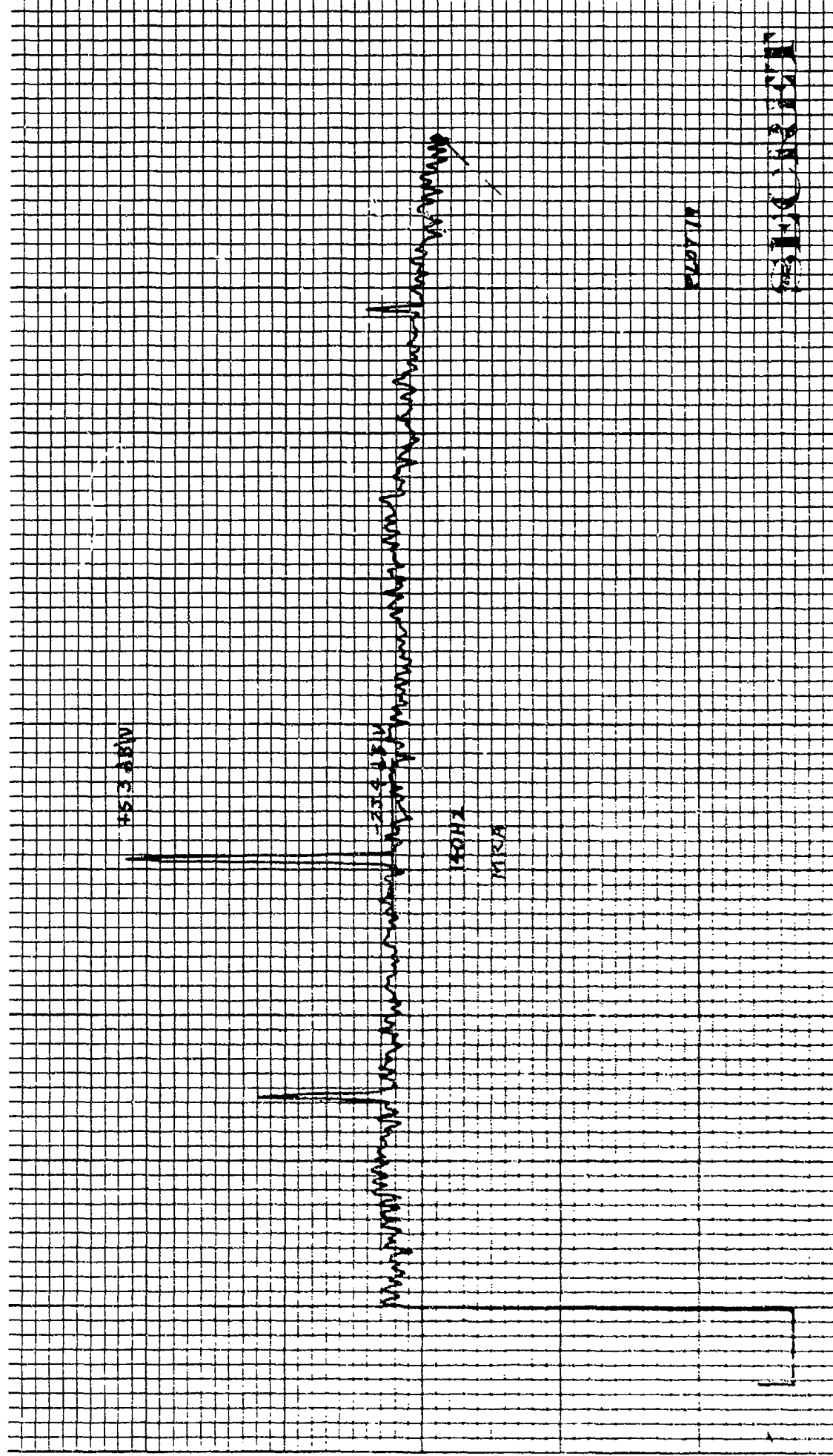
EXERCISE: BEARING S.
CENTER FREQ: 150 HZ

ANALYSIS BANDWIDTH: 1/1

CENTER FREQ: 150 HZ

16 ELEMENTS

+64.0 DEG. AZ STEERING



THE

576

ZH081

46 0703

REEL: M19
INTEGRATION TIME 320 SECS
INDEX/637
ATTEN: -1/2 DB
WTG: HANNING
FILTER

DATE OF ANALYSIS: - - - - -
1-6 49-17)
DATE/TIME: 3-16-77 - 0633 Z
ANALYSIS BANDWIDTH: 1/10HZ
+ 14.5 DEG. AZ STEERING

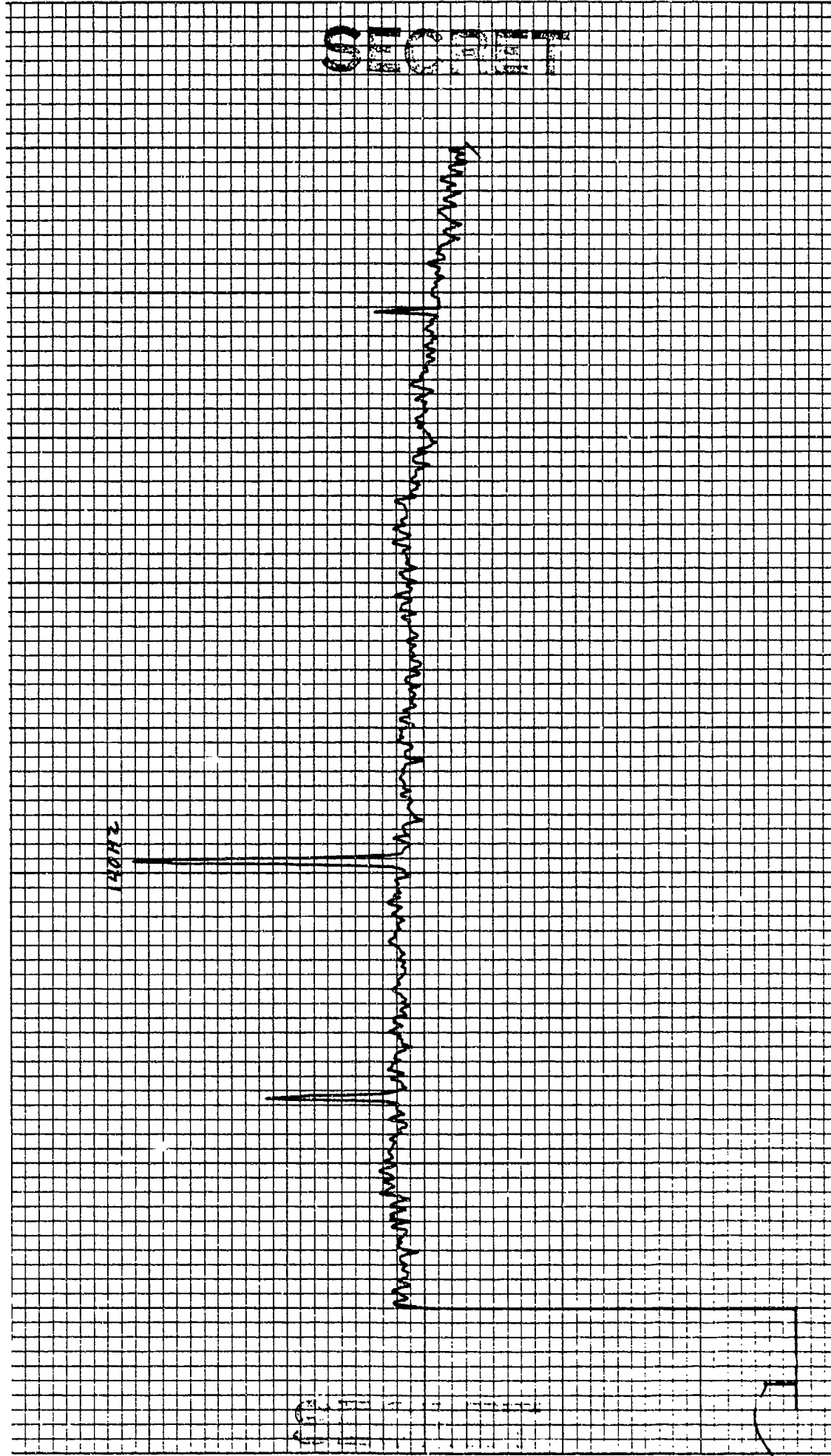
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SECRET

1. Definition
 2. Properties
 3. Examples
 4. Applications
 5. Conclusion

46 0703

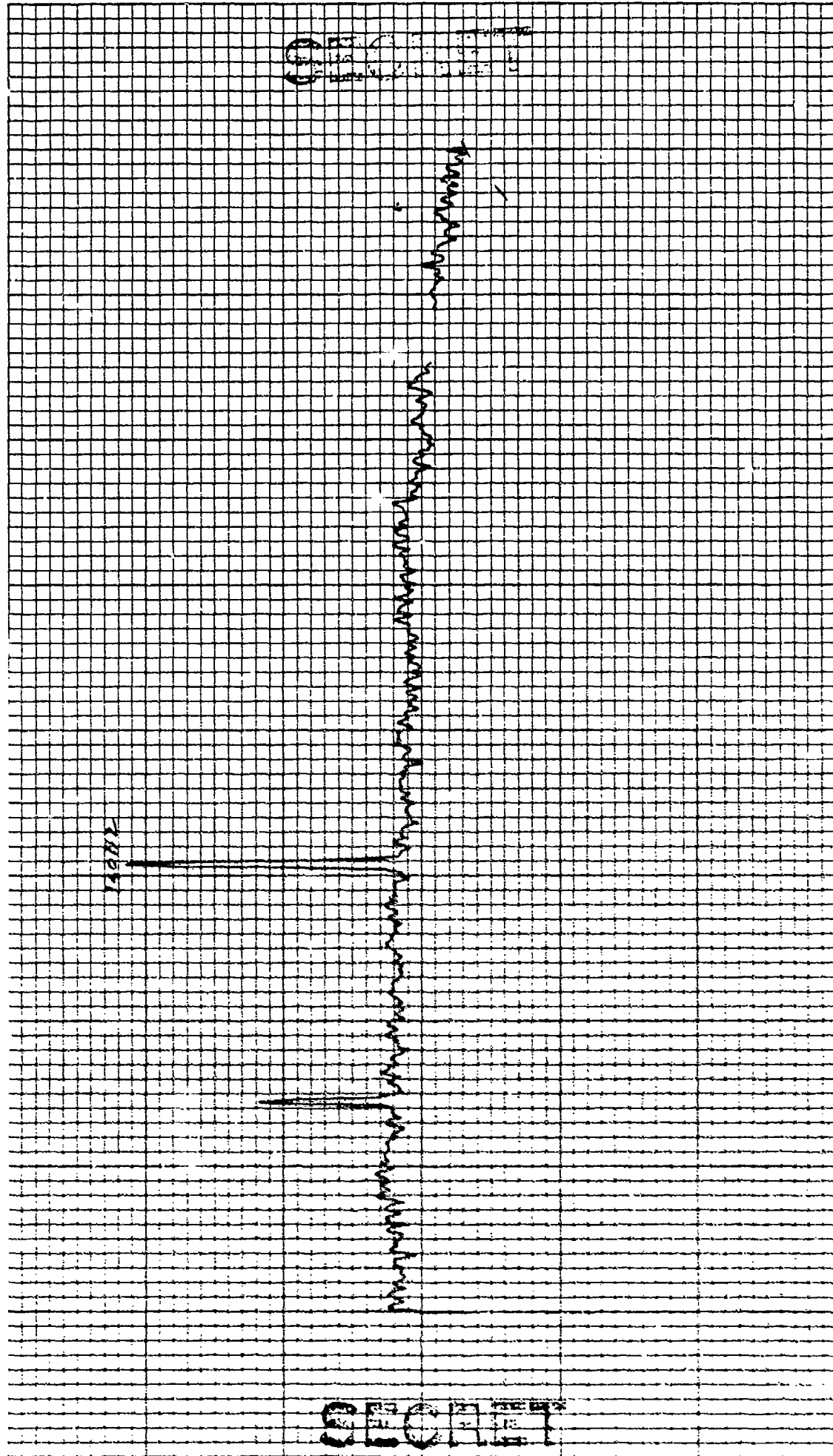
CONTROL: 0633 - 16 (0910)
BEAMFORMED SPECTRUM(ELEMENTS
EXERCISE: BEARING STAKE
CENTER FREQ: 150 HZ
16 ELEMENTS
DATE OF ANALYSIS: - - - -
1-6 4 8-17)
DATE/TIME: 3-16-77 - 0633 Z
ANALYSIS BANDWIDTH: 1/10HZ
+66 DEG. AZ STEERING
INTEGRATION TIME 320 SECS
FILTER
REEL: 419
INDEX: 0377
ATTN: -12-DB
WTG: HANNING



K-E 10 X 10 TO THE INCH 0.7 X 10 INCHES
KEUFFEL & ESSER CO. MADE IN U.S.A.

46 0703

CONTROL: 0633 - 16 (DP10) REEL: 419 INDE X 1637
BEAMFORMED SPECTRUM (ELEMENTS) DATE OF ANALYSIS: - - -
EXERCISE: BEARING STAKE 1-68 9-17)
CENTER FREQ: 150 HZ DATE/TIME: 3-16-77 - 0633Z
16 ELEMENTS ANALYSIS BANDWIDTH: 1/10HZ
+60 DEG. AZ STEERING FILTER WTG: HANNING
ATTEN: -12-DB
INTEGRATION TIME 320 SECS

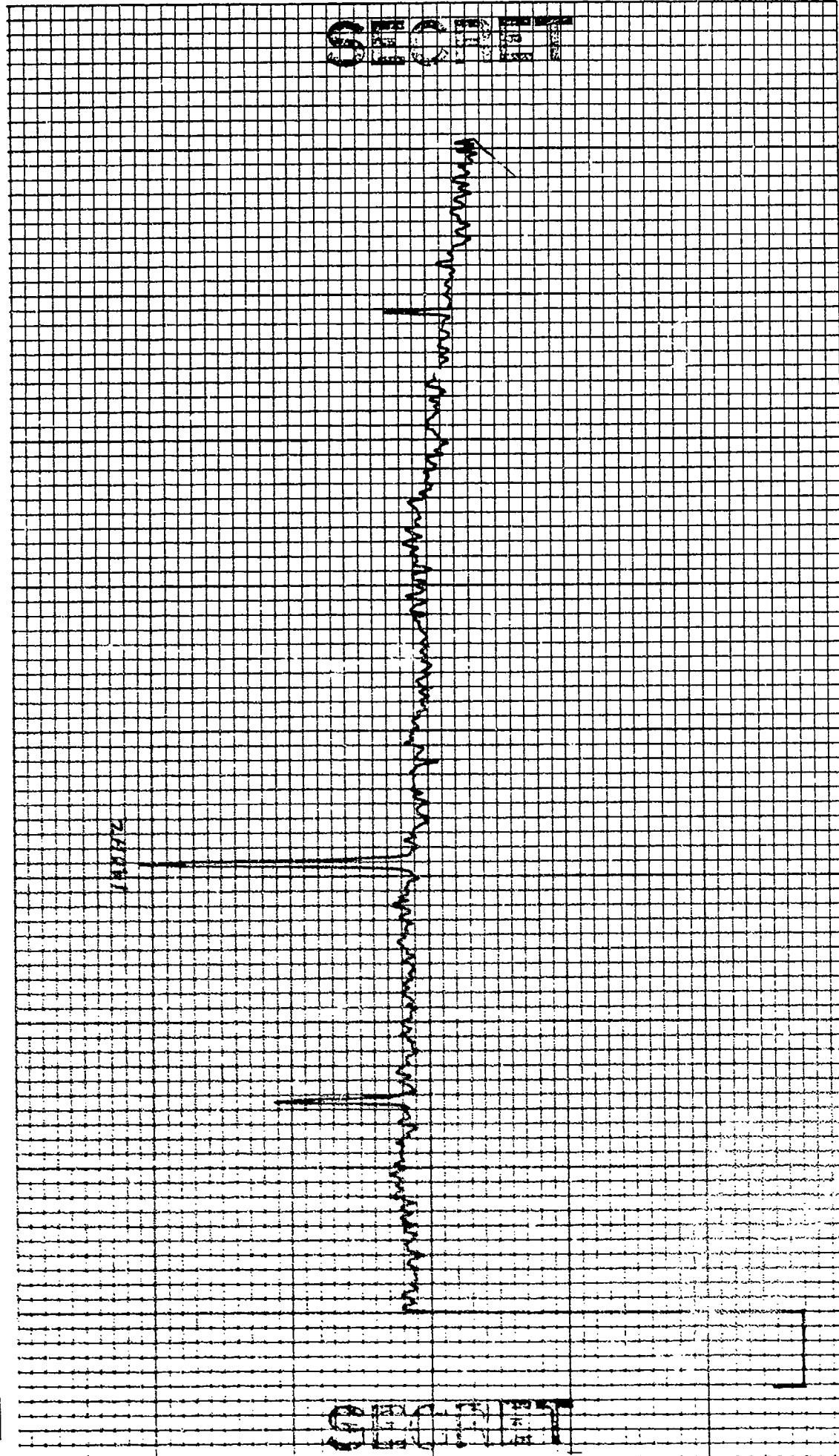


10 X 10 TO THE INCH = 7 X 10 INCHES
REDFILL & ESSER CO. MADE IN U.S.A.

46 0703

CONTROL: 0633 - 16 (DP10) REEL: M19 INDE X/637
BEAMFORMED SPECTRUM (ELEMENTS) DATE OF ANALYSIS: - - -
EXERCISE: BEARING STAKE /-6 & 9-17)
CENTER FREQ: 150 HZ DATE/TIME: 3-16-77-0633 Z
/6 ELEMENTS ANALYSIS BANDWIDTH: 1/10 HZ
+ 70 DEG. AZ STEERING

INTEGRATION TIME 320 SECS
ATTEN: -12 DB
FILTER
WTG: HANNING

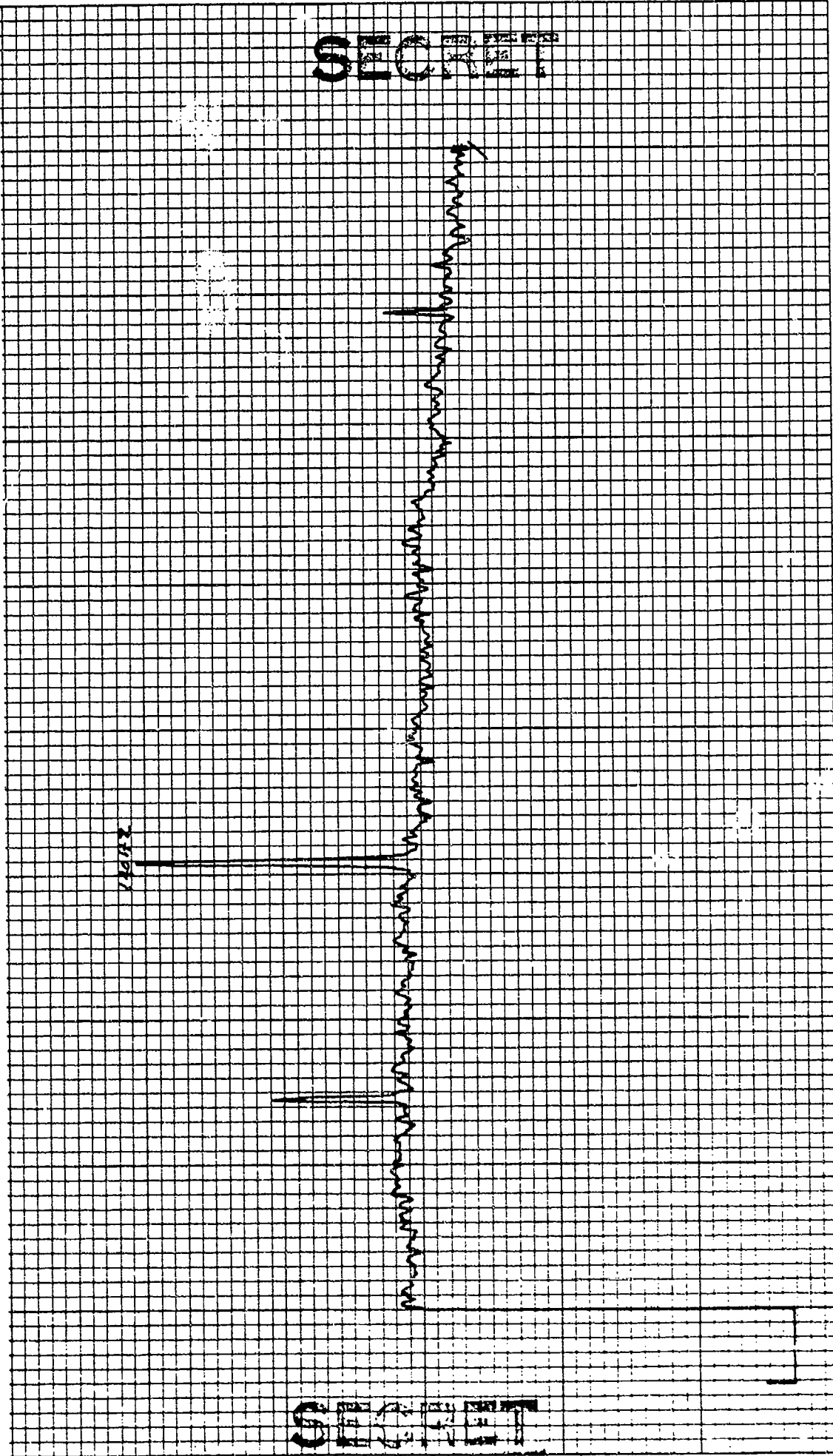


KOE 10 X 10 TO THE INCH • 7 X 10 INCHES
HEUFFEL & ESSER CO. MADE IN U.S.A.

46 0703

CONTROL: 0633 - 16 (DP10) REEL: M19 INDE X 1627
BEAMFORMED SPECTRUM (ELEMENTS) DATE OF ANALYSIS: 1-6 49-17)
EXERCISE: BEARING STAKE DATE/TIME: 3-12-77 - 0633 Z
CENTER FREQ: 150 HZ ANALYSIS BANDWIDTH: 1/10 HZ
1/2 ELEMENTS 172 DEG. AZ STEERING

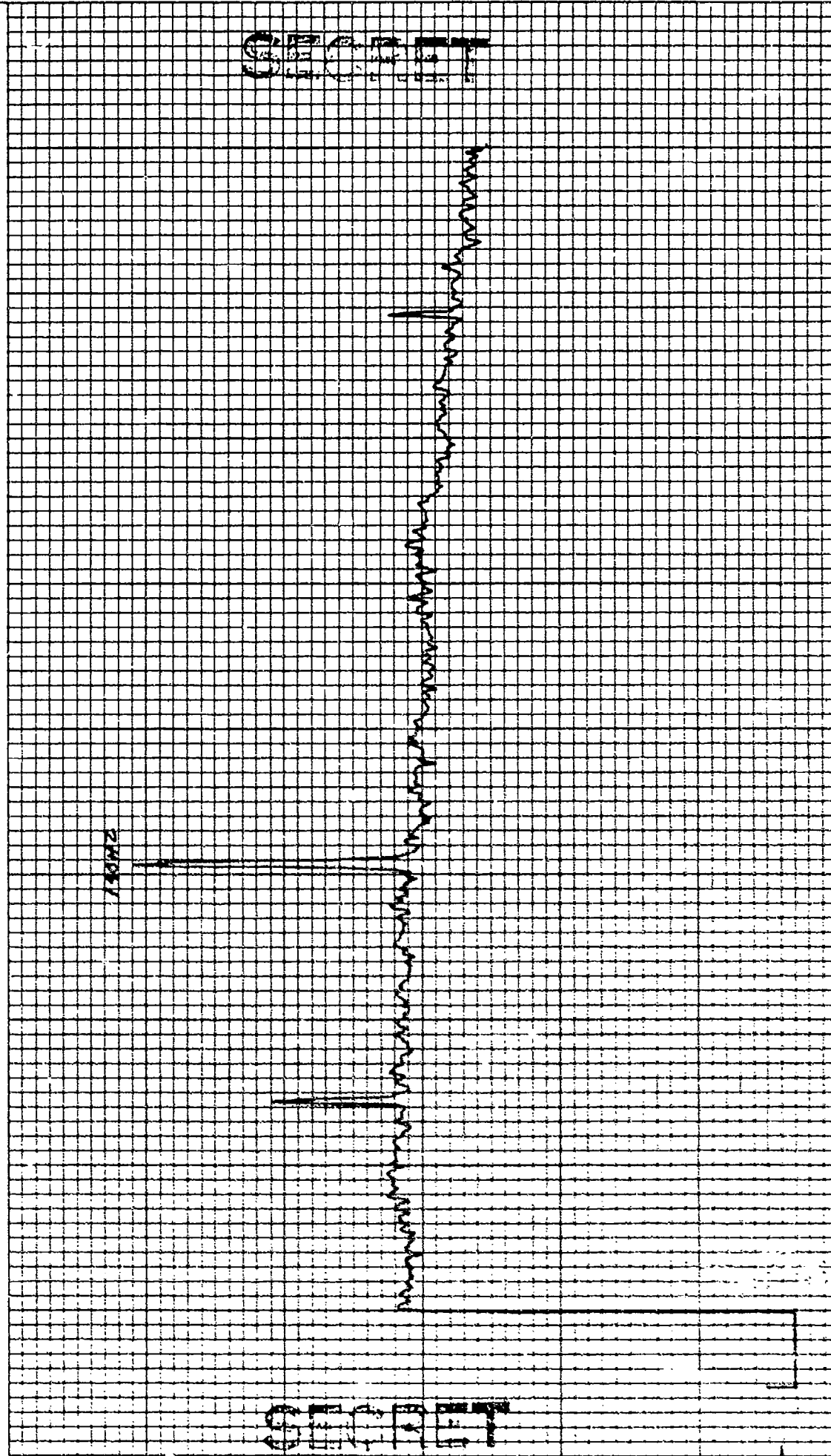
INTEGRATION TIME 320 SECS
FILTER WTG: HANNING



K.E 10 X 10 TO THE INCH • 7 X 10 INCHES
KEUFFEL & ESSER CO. MADE IN U.S.A.

46 0703

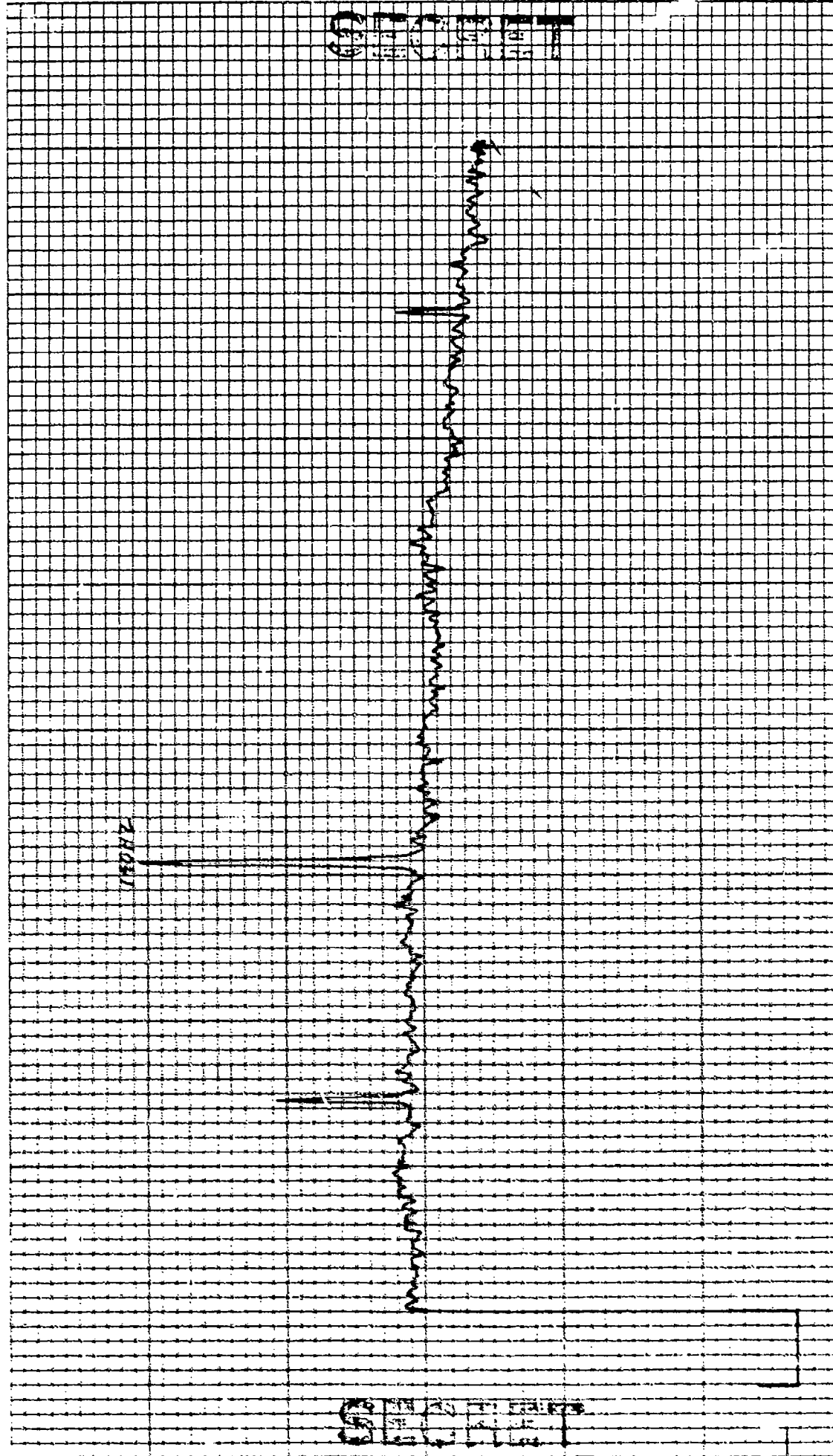
CONTROL: 0633 - 16 (DP10)
BEAMFORMED SPECTRUM (ELEMENTS)
EXERCISE: BEARING STAKE
CENTER FREQ: 150 HZ
16 ELEMENTS
DATE OF ANALYSIS: 1-6 & 8-17
DATE/TIME: 3-6-77 - 0633 Z
ANALYSIS BANDWIDTH: 1/10HZ
+74 DEG. AZ STEERING
REEL: H/9
INDE X/637
INTEGRATION TIME 320 SECS
ATTEN: -12 DB
FILTER
WTG: HANNING



10 X 10 TO THE INCH 7 X 10 INCHES
REPUFFEL & EGGCH CO. MADE IN U.S.A.

46 0703

CONTROL: 0633 - 16 (D910) DATE OF ANALYSIS: - - - - - REEL: M19 INDE X1637
BEAMFORMED SPECTRUM(ELEMENTS) /-6 & 9-17)
EXERCISE: BEARING STAKE DATE/TIME: 7-16-77 - 0633 Z INTEGRATION TIME 320 SECS ATTN: -12 DB
CENTER FREQ: 150 HZ ANALYSIS BANDWIDTH: 1/10 HZ FILTER WTG: HANNING
16 ELEMENTS 476 DEG. AZ STEERING

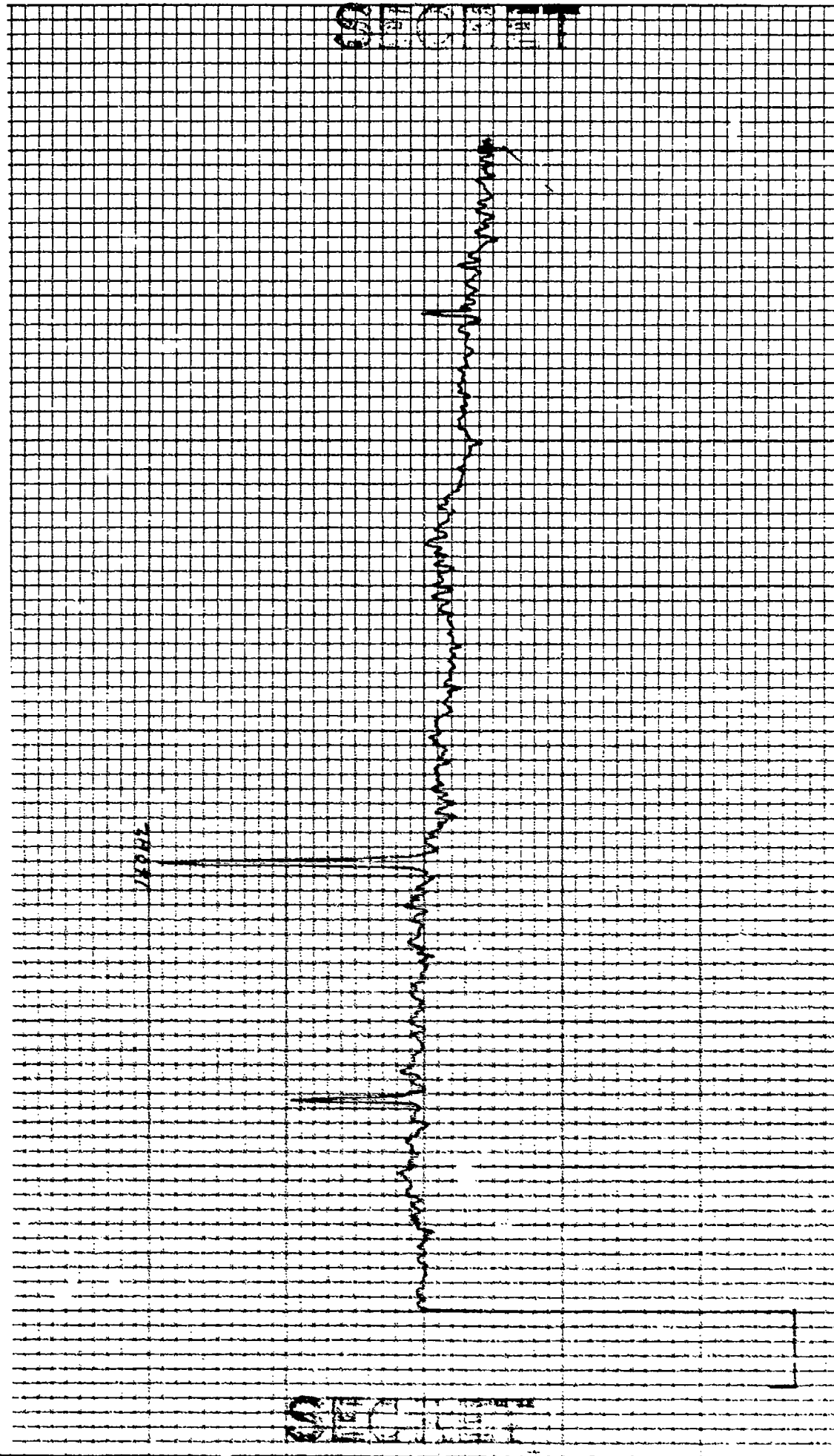


10 X 10 TO FIVE INCHES
MELPUCEL 6, ESSER CO. MADE IN U.S.A.

46 0703

CONTROL: 0633 - 16 (DP10) REEL: M/9 INDE X/637
BEAMFORMED SPECTRUM (ELEMENTS) DATE OF ANALYSIS: 1-6-8 9-17
EXERCISE: BEARING STAKE DATE/TIME: 7-6-77 - 0633 Z
CENTER FREQ: 150 HZ ANALYSIS BANDWIDTH: 1/10 HZ
16 ELEMENTS 478 DEG. AZ STEERING

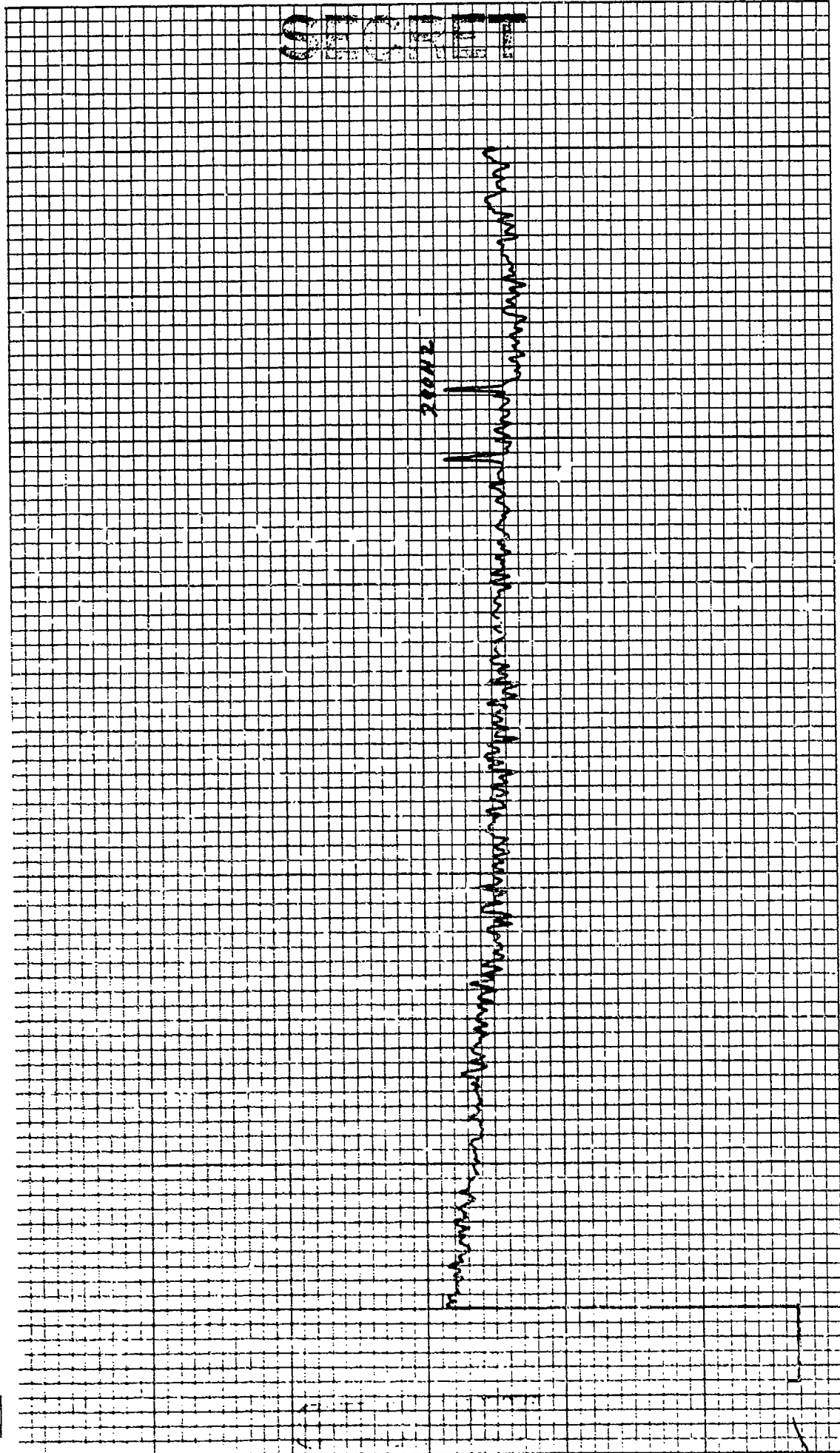
INTEGRATION TIME 320 SECS
ATTEN: -7.2 DB
WTG: HANNING



KOE 10 X 10 TO THE INCH • 7 X 10 INCHES
KELPPEL & RUBEN CO. MADE IN U.S.A.

46 0703

CONTROL: 0833 - 16 (0910) DATE OF ANALYSIS: 1-6-8-17 REEL: H18 INDE X637
BEAMFORMED SPECTRUM (ELEMENTS) 16 ELEMENTS
EXERCISE: BEARING STAKE
CENTER FREQ: 270 HZ
ANALYSIS BANDWIDTH: 1/10 HZ
+ 50 DEG. AZ STEERING
INTEGRATION TIME 320 SECS
FILTER
ATTEN: -12 DB
WTG: HANNING



K-2 10 X 10 TO THE INCH • 7 X 10 INC-IES
KEUFFEL & ESSER CO. MADE IN U.S.A.

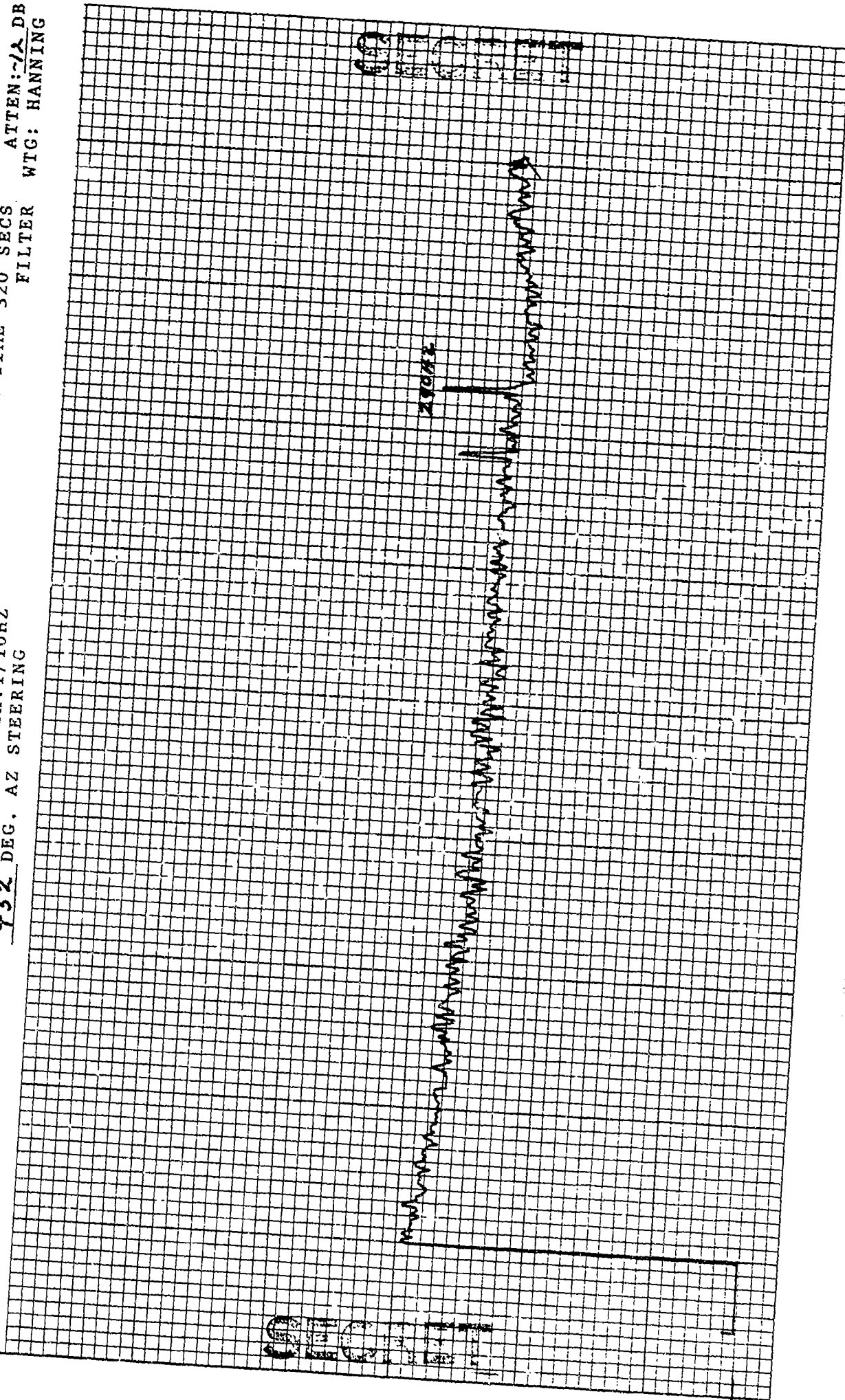
46 0703

CONTROL: 0633 - 16 (DP10)
BEAMFORMED SPECTRUM (ELEMENTS)
EXERCISE: BEARING STAKE
CENTER FREQ: 270 HZ
16 ELEMENTS

DATE OF ANALYSIS: 1-68 9-17
DATE/TIME: 3-6-77 - 0633Z
ANALYSIS BANDWIDTH: 1/10HZ
452 DEG. AZ STEERING

REEL: 419 INDE X/637

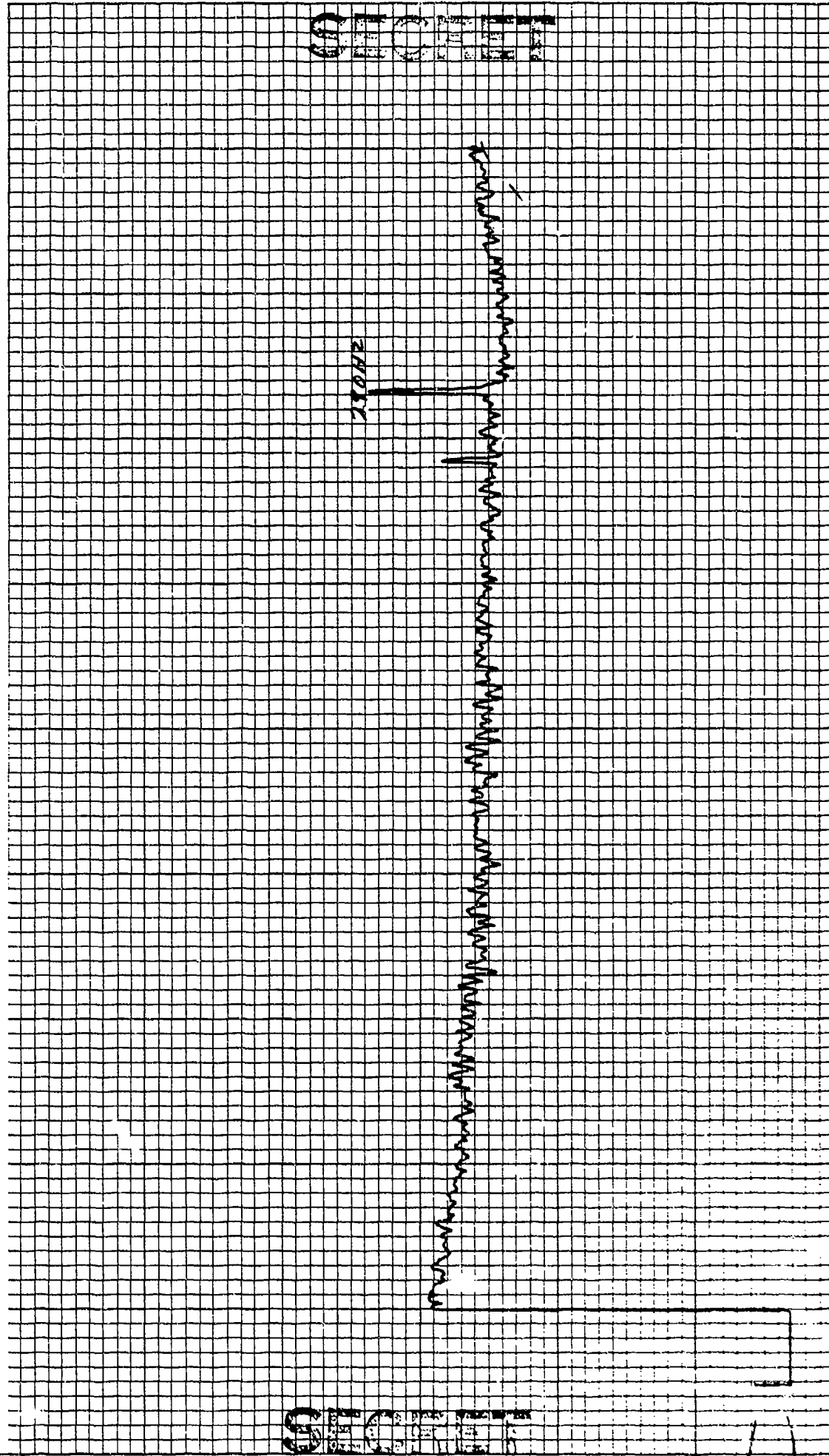
INTEGRATION TIME 320 SECS
FILTER
ATTEN: -1A DB
WTG: HANNING



K•E 10 X 10 TO THE INCH • 7 X 10 INCHES
KEUFFEL & ESSER CO. MADE IN U.S.A.

46 0703

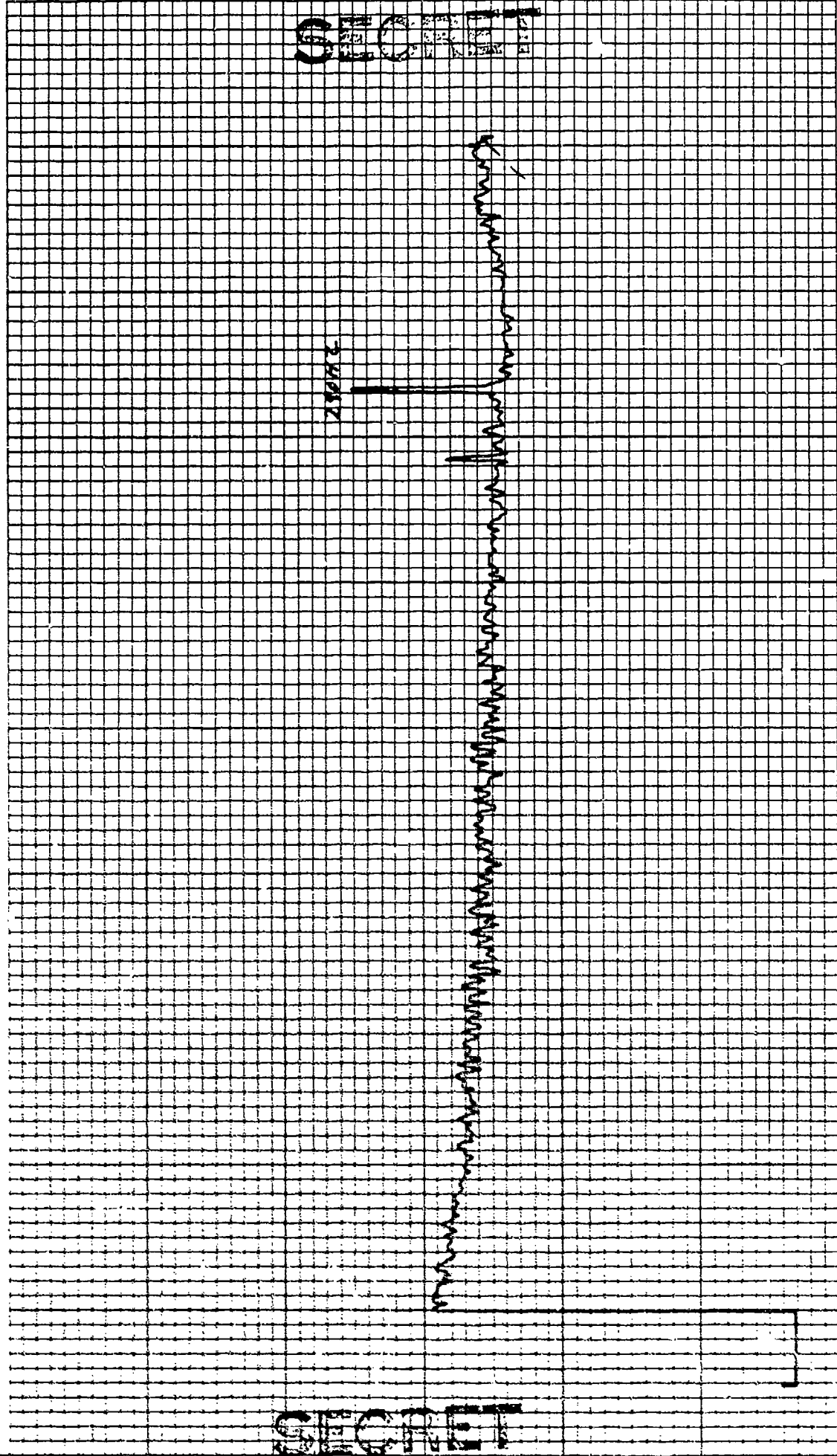
CONTROL: 0633 - 16 (0010) DATE OF ANALYSIS: 1-6-77-17) REEL: M19 INDE X/637
BEAMFORMED SPECTRUM (ELEMENTS) DATE/TIME: 3-16-77 - 0633 Z INTEGRATION TIME 320 SECS ATTN: -12 DB
EXERCISE: BEARING STAKE ANALYSIS BANDWIDTH: 1/10HZ FILTER WTG: HANNING
CENTER FREQ: 270 HZ +54 DEG. AZ STEERING



KSE 10 X 10 TO THE INCH • 7 X 10 INCHES
ACUPTEL & COSEY CO. MADE IN U.S.A.

46 0703

CONTROL: 0633 - 16 (DP16) DATE OF ANALYSIS: 1-6 8-17 INDE X/637
BEAMFORMED SPECTRUM(ELEMENTS) REEL: 419
EXERCISE: BEARING STAKE INTEGRATION TIME 320 SECS ATTN: -1A DB
CENTER FREQ: 270 HZ ANALYSIS BANDWIDTH: 1/10HZ FILTER WTG: HANNING
16 ELEMENTS 4.56 DEG. AZ STEERING



K-E 30 X 10 TO THE INCH • 7 X 10 INCHES
KEUFFEL & ESSER CO. MADE IN U.S.A.

46 0703

CONTROL: 0633-16 (DP10) DATE OF ANALYSIS: 1-6-89-17 REEL: M19 INDE X1637
BEAMFORMED SPECTRUM(ELEMENTS))
EXERCISE: BEARING STAKE DATE/TIME: 3-16-77 - 0633 Z INTEGRATION TIME 320 SECS ATTN: -12 DB
CENTER FREQ: 270 HZ ANALYSIS BANDWIDTH: 1/10 HZ FILTER WTG: HANNING
16 ELEMENTS +50 DEG. AZ STEERING

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SECRET

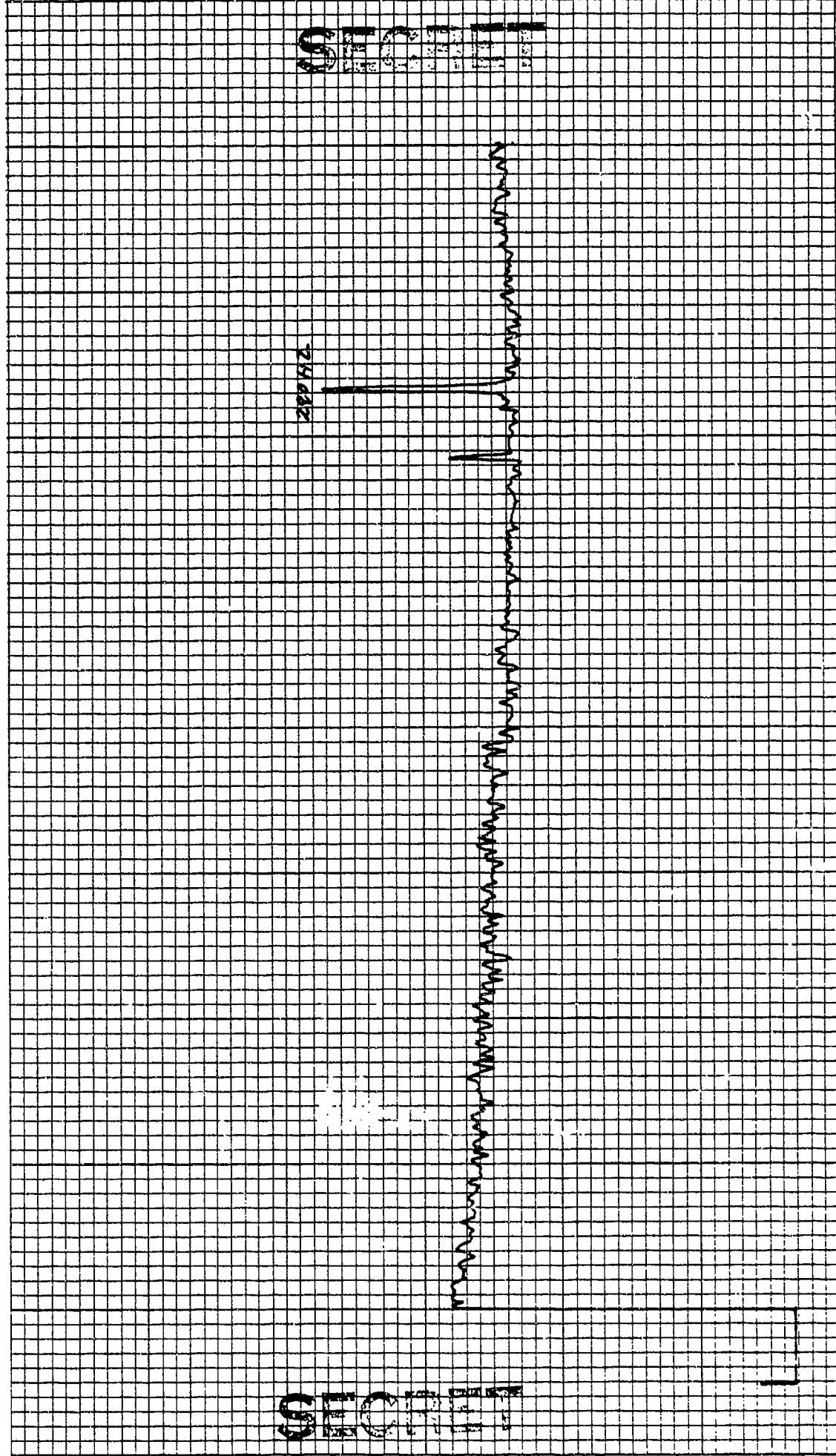
200002

Handwritten notes and a vertical line on the graph grid.

K-E 10 X 10 TO THE INCH • 7 X 10 INCHES
KEUFFEL & ESSER CO. MADE IN U.S.A.

46 0703

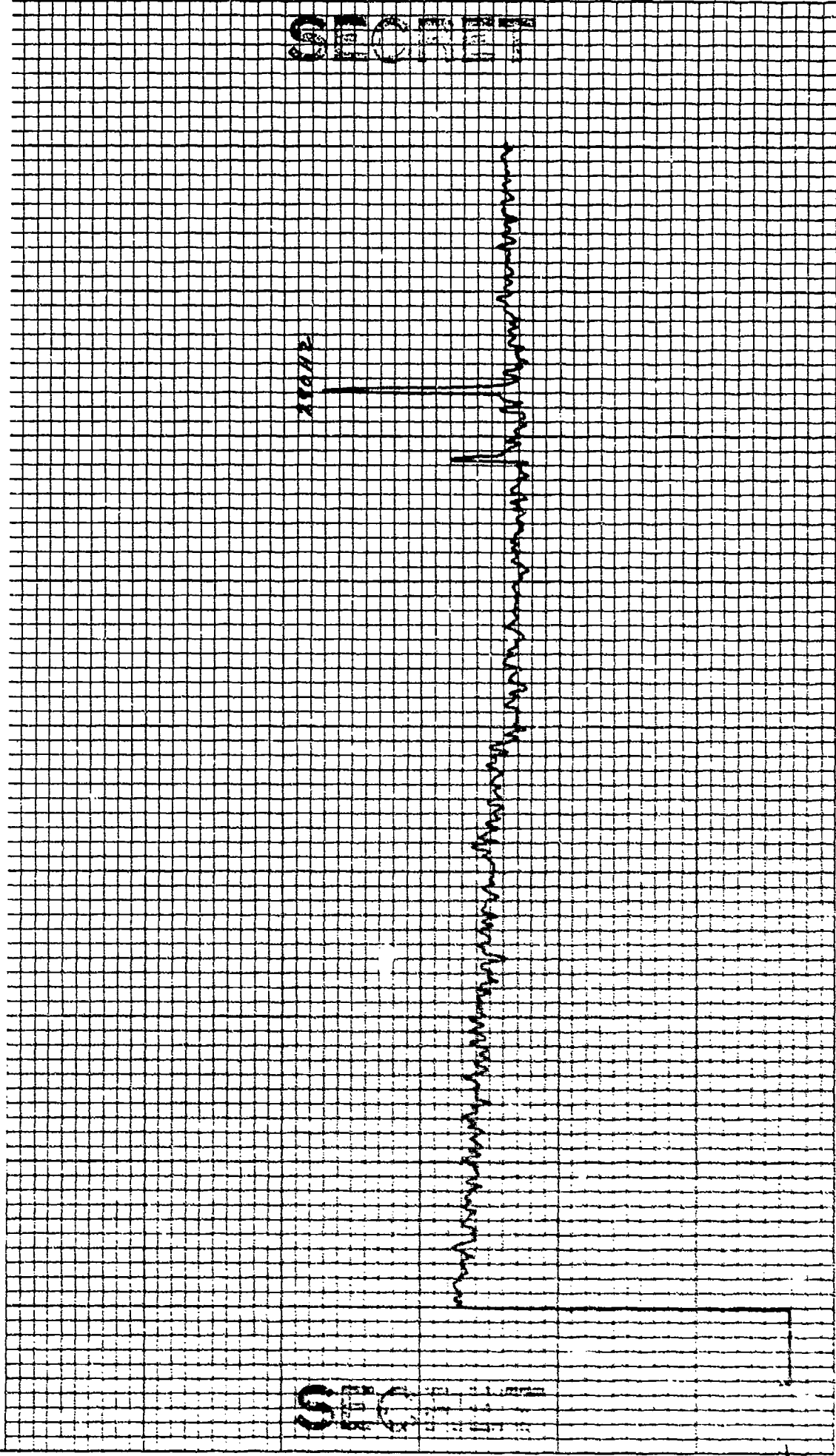
CONTROL: 0633 - 16 (DPIO) REEL: M19 INDE X/637
BEAMFORMED SPECTRUM(ELEMENTS) DATE OF ANALYSIS: 1-6 & 8-17
EXERCISE: BEARING STAKE DATE/TIME: 3-16-77 - 0633 Z INTEGRATION TIME 320 SECS ATTN: -12 DB
CENTER FREQ: 270 HZ ANALYSIS BANDWIDTH: 1/10HZ FILTER WTG: HANNING
16 ELEMENTS +60 DEG. AZ STEERING



K.E 10 X 10 TO THE INCH • 7 X 10 INCHES
KEUFFEL & ESSER CO. MADE IN U.S.A.

46 0703

CONTROL: 0633 - 16 0910) DATE OF ANALYSIS: 1-6-77 - 0633 Z REEL: M19 INDEX: X/637
BEAMFORMED SPECTRUM(ELEMENTS) 1-6-77-17)
EXERCISE: BEARING STAKE DATE/TIME: 3-16-77 - 0633 Z INTEGRATION TIME 320 SECS ATTN: -72 DB
CENTER FREQ: 270 HZ ANALYSIS BANDWIDTH: 1/10HZ FILTER WTG: HANNING
16 ELEMENTS +62 DEG. AZ STEERING



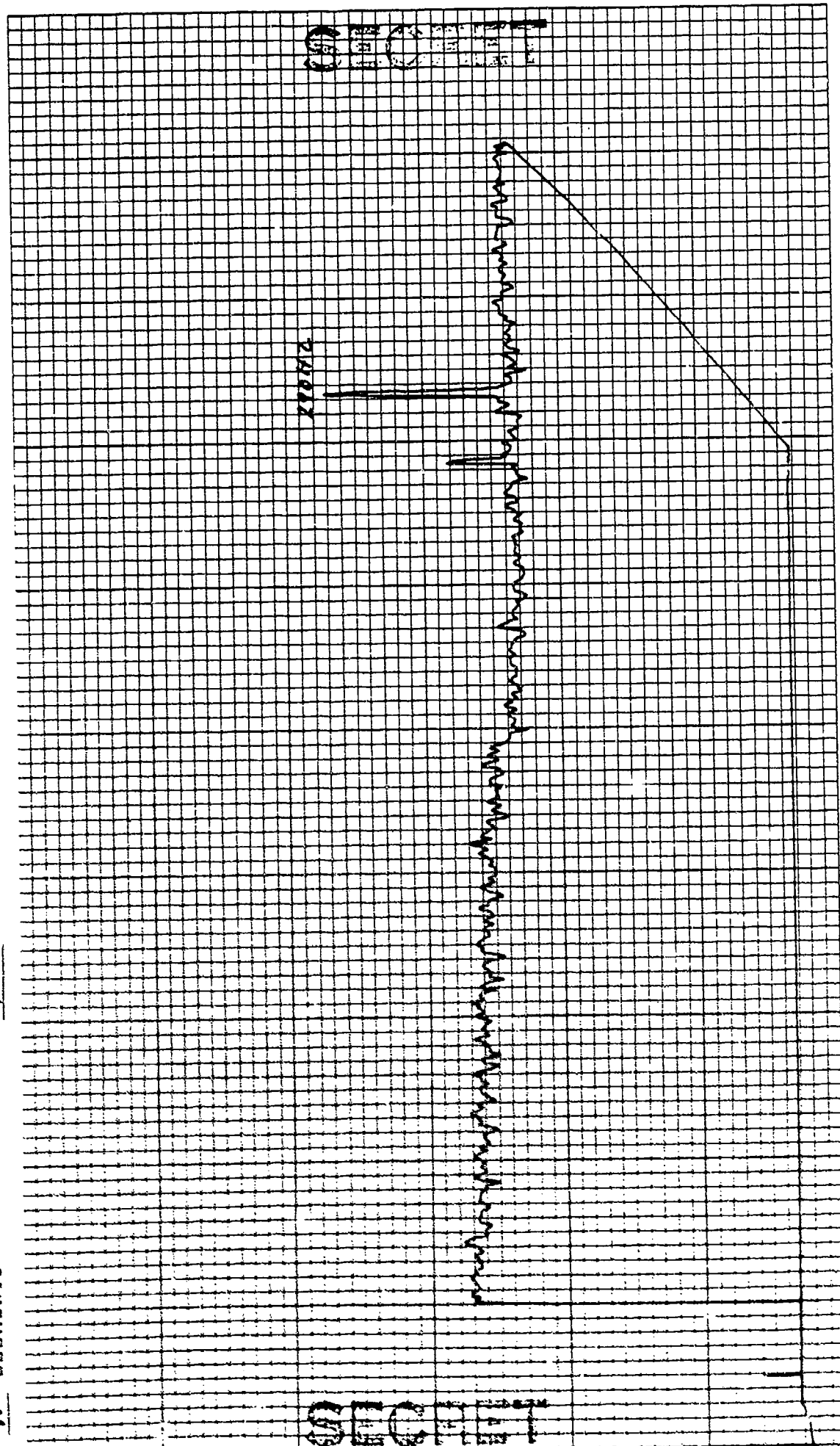
46 0703

REEL: M19

INTEGRATION TIME 320 SECS ATTN: ~12 DB
 FILTER WTC: HANNING

INDEX X1637

DATE OF ANALYSIS: 1-6-77
DATE/TIME: 3-16-77 - 0633Z
ANALYSIS BANDWIDTH: 1/10HZ
+63 DEC. AZ STEERING



KOE 10 X 10 TO THE INCH 10 X 10 INCHES
KEUFFEL & ESSER CO. MADE IN U.S.A.

46 0703

CONTROL: 0633 - 16 (DP10) REEL: M19 INDE X/637
BEAMFORMED SPECTRUM (ELEMENTS) DATE OF ANALYSIS: 1-6-8-17
EXERCISE: BEARING STAKE DATE/TIME: 3-16-77 - 0633 Z
CENTER FREQ: 270 HZ ANALYSIS BANDWIDTH: 1/10 HZ
16 ELEMENTS + 63.5 DEG. AZ STEERING

INTEGRATION TIME 320 SECS
FILTER WTG: HANNING

SECRET

SECRET

SECRET

KOE 10 X 10 TO THE INCH • 7 X 10 INCHES
KEUFFEL & ESSER CO. MADE IN U.S.A.

46 0703

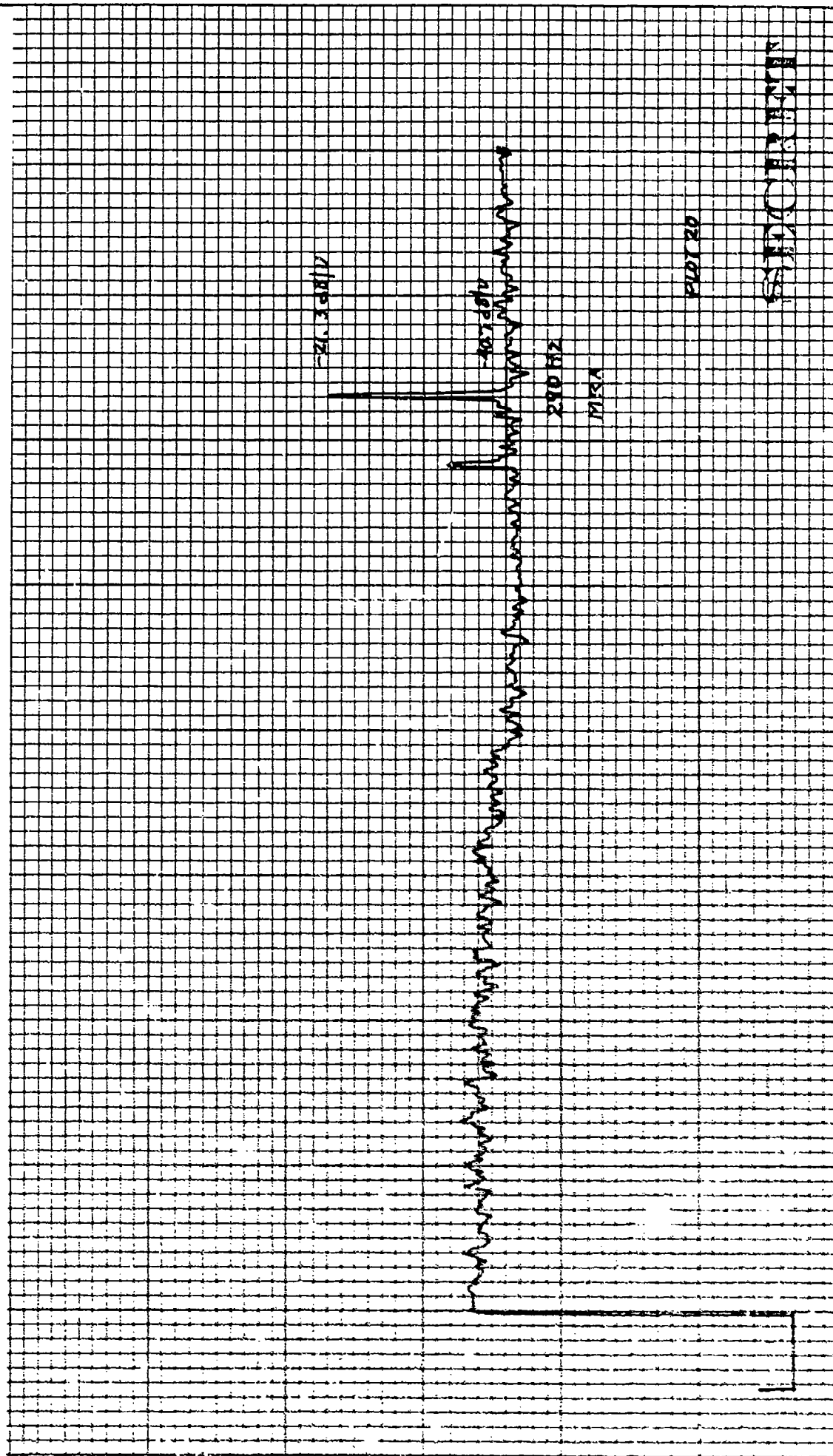
SECRET

CONTROL: 0633 - 49 (DP10)
BEANFORMED SPECTRUM(ELEMENTS 1706 & 97017)
EXERCISE: BEARING STAKE
CENTER FREQ: 270 HZ
16 ELEMENTS

REEL: M19 INDE X/637

INTEGRATION TIME 320 SECS
ATTEN: - DB
FILTER WTG: HANNING

DATE/TIME: 3-6-77 - 0633 Z
ANALYSIS BANDWIDTH: 1/10 HZ
+64.0 DEG. AZ STEERING



232

270 HZ

308

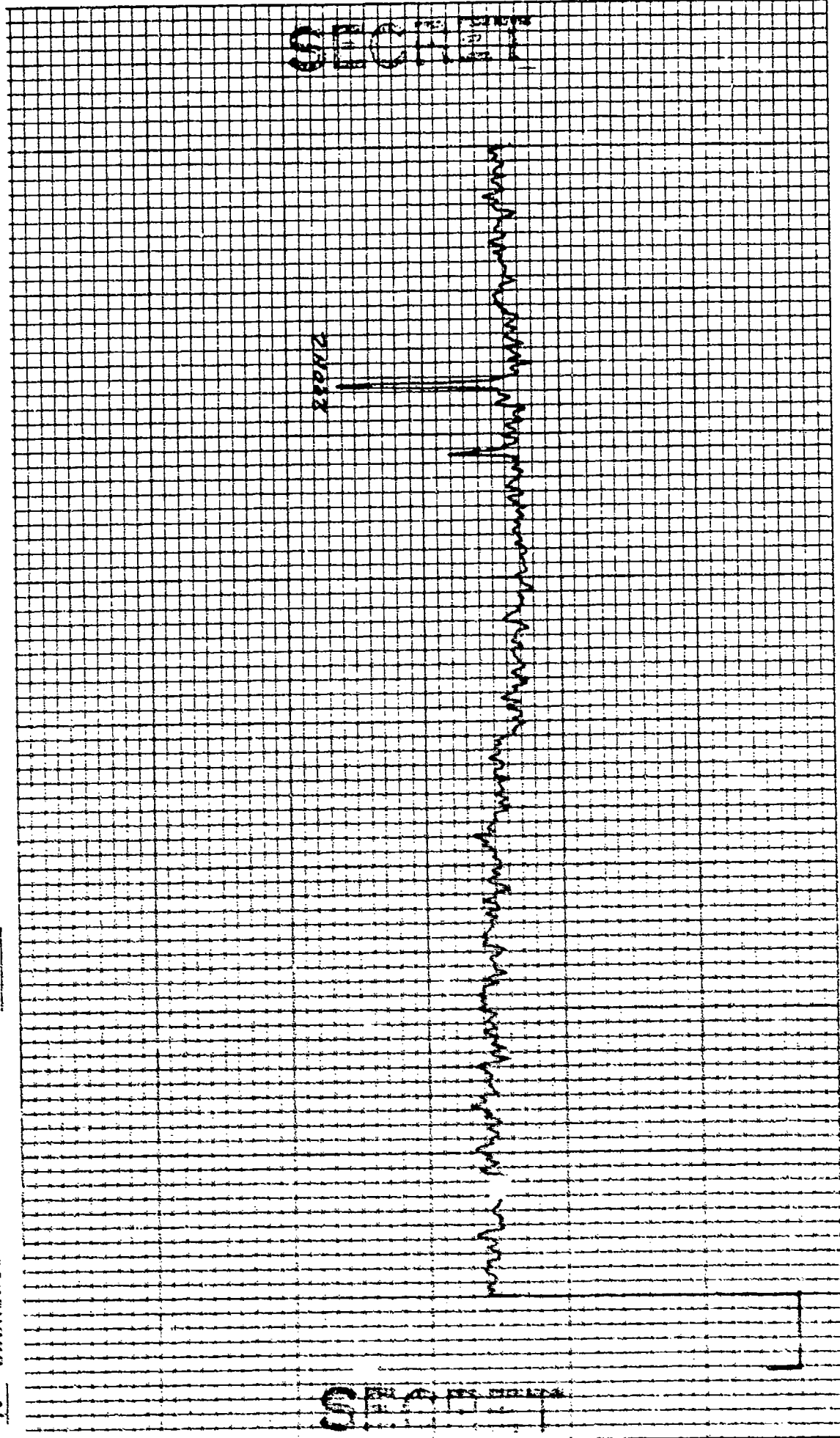
1405 10 X 10 TO THE INCH - 7 X 10 INCHES
REUSFEL & ENGER CO. MADE IN U.S.A.

46 0703

CONTROL: 0633 - 16 (DP10)
BEAMFORMED SPECTRUM (ELEMENTS)
EXERCISE: BEARING STAKE
CENTER FREQ: 270 HZ
16 ELEMENTS

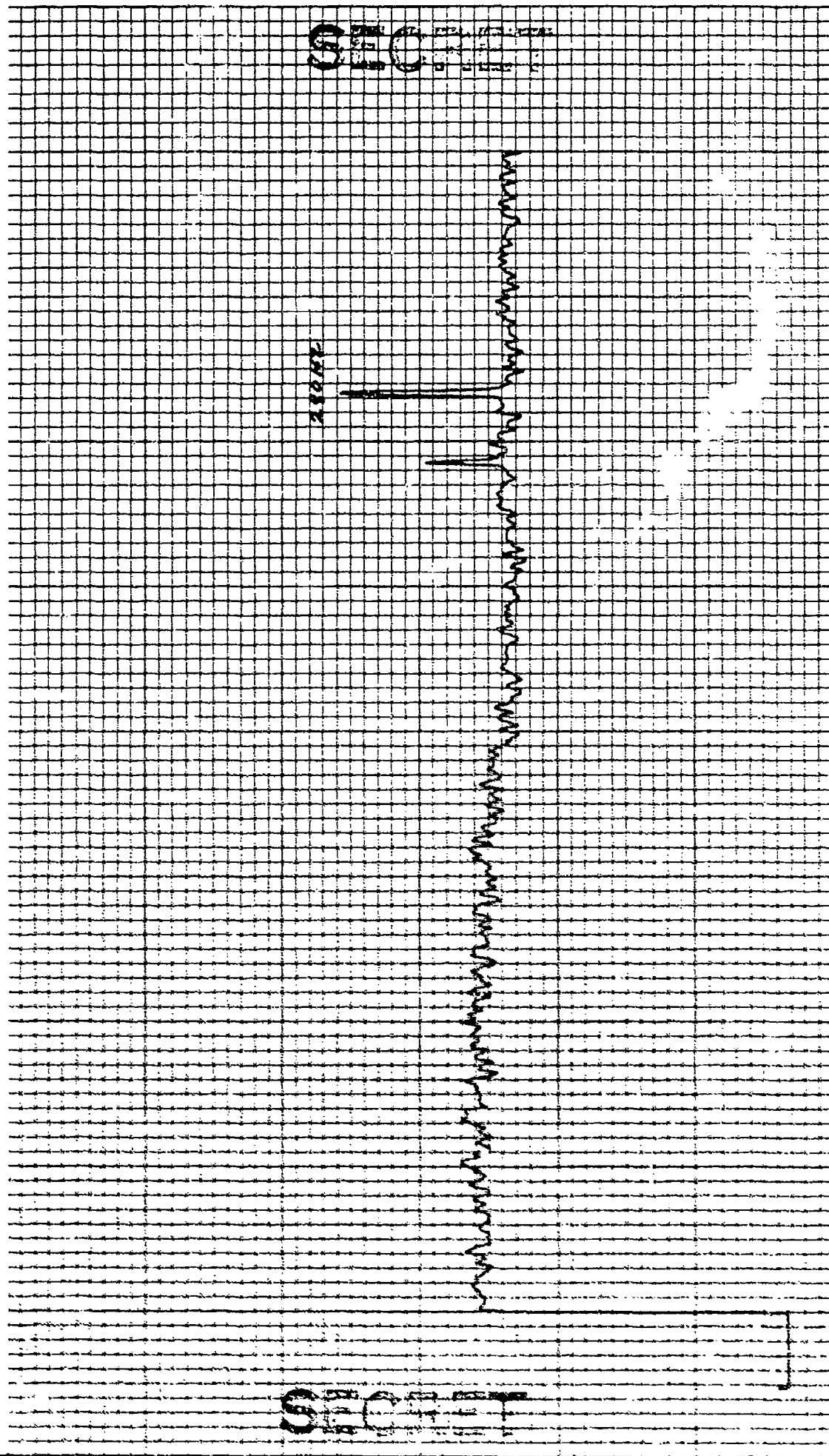
DATE OF ANALYSIS: 1-6-77
DATE/TIME: 3-16-77 - 0633 Z
ANALYSIS BANDWIDTH: 1/10 HZ
+64.5 DEG. AZ STEERING

REEL: H19
INTEGRATION TIME 320 SECS
FILTER WTG: HANNING
INDEX: 677

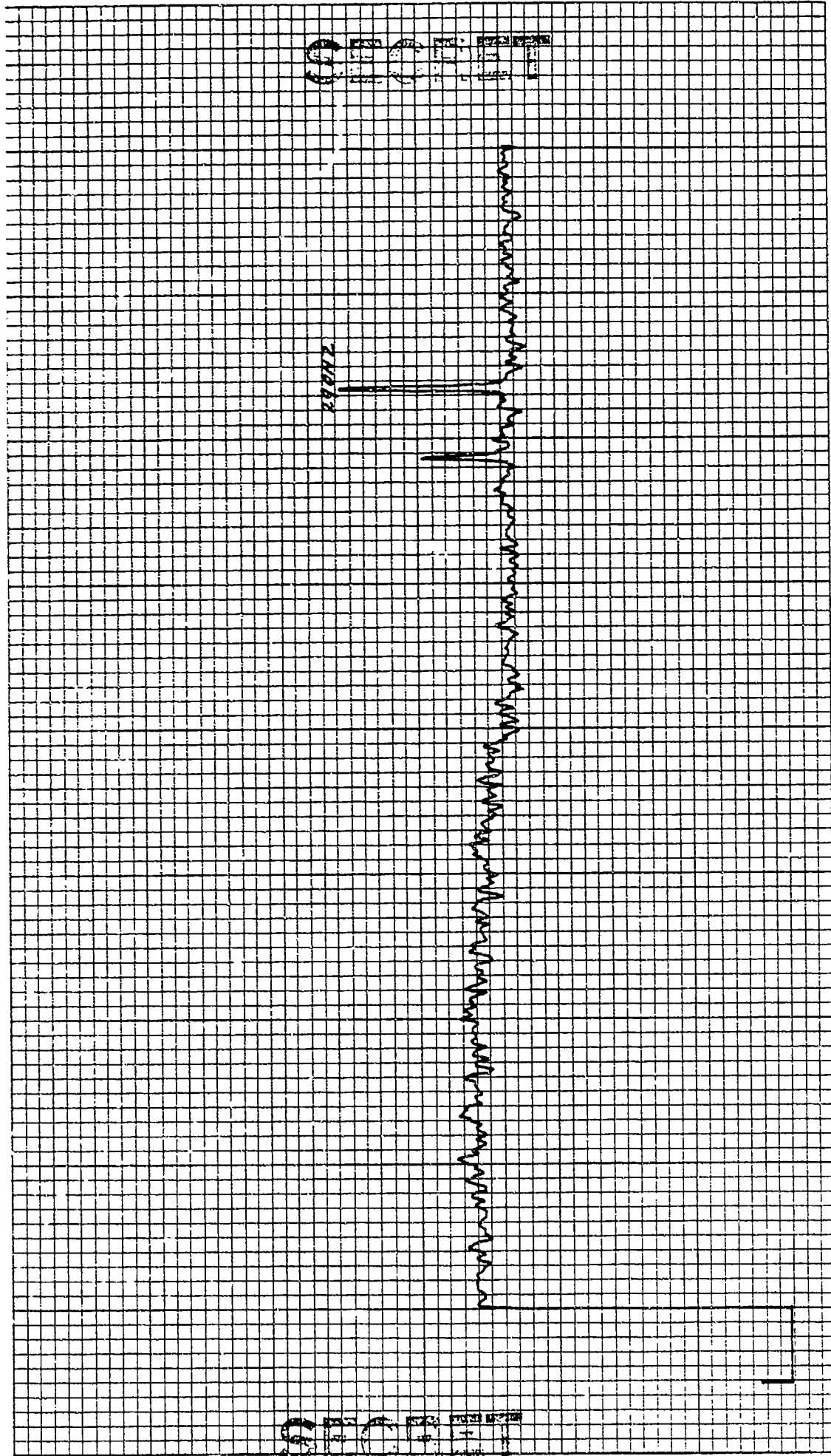


46 0703

CONTROL: 0033 - 16 (DP10)
BEAMFORMED SPECTRUM(ELEMENTS
EXERCISE: BEARING: STAKE
CENTER FREQ: 270 HZ
16 ELEMENTS
DATE OF ANALYSIS: - - -
1-64 8-17)
DATE/TIME: 346-77 - 0633 Z
ANALYSIS BANDWIDTH: 1/10HZ
+66 DEG. AZ STEERING
INTEGRATION TIME 320 SECS
FILTER
ATTEN: 1A DB
WTC: HANNING
REEL: M18
INDEX X1637



CONTROL: 0633-16 (DP10) DATE OF ANALYSIS: 1-6-89-17 REEL: M19 INDE X/632
 BEAMFORMED SPECTRUM: (ELEMENTS) DATE/TIME: 3-16-77-0633Z INTEGRATION TIME 320 SECS ATTN: -1.2 DB
 EXERCISE: BEARING STAKE ANALYSIS BANDWIDTH: 1/10HZ FILTER WTG: HANNING
 CENTER FREQ: 270 HZ
 16 ELEMENTS +60 DEG. AZ STEERING



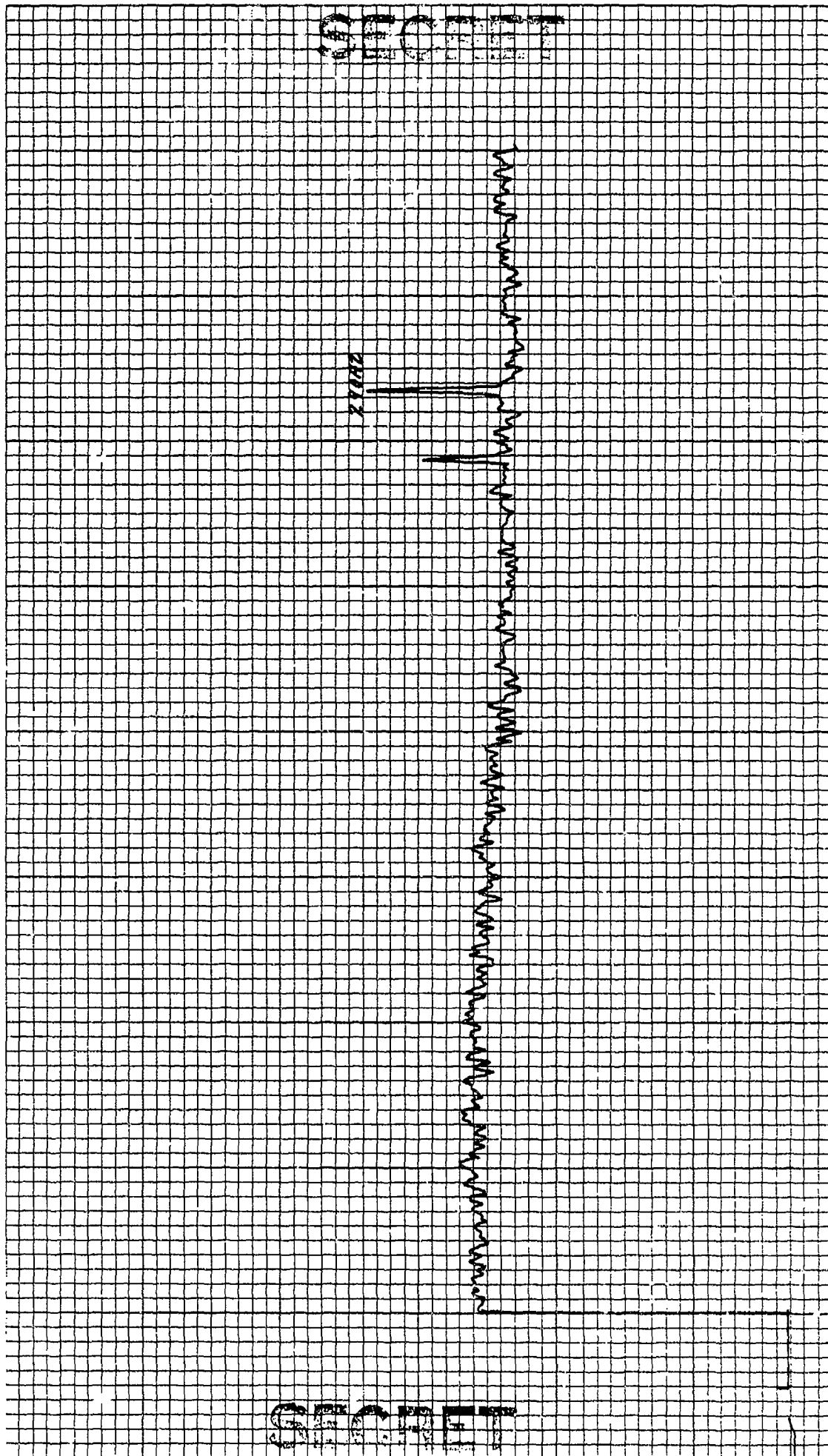
K·E 10 X 10 TO THE INCH • 7 X 10 INCHES
KEUFFEL & ESSER CO. MADE IN U.S.A.

46 0703

CONTROL: 0633 - 16 (DP10)
BEAMFORMED SPECTRUM (ELEMENTS)
EXERCISE: BEARING STAKE
CENTER FREQ: 270 HZ
16 ELEMENTS

DATE OF ANALYSIS: 1-6-77
DATE/TIME: 3-16-77 - 0633 Z
ANALYSIS BANDWIDTH: 1/10 Hz
+ 70 DEG. AZ STEERING

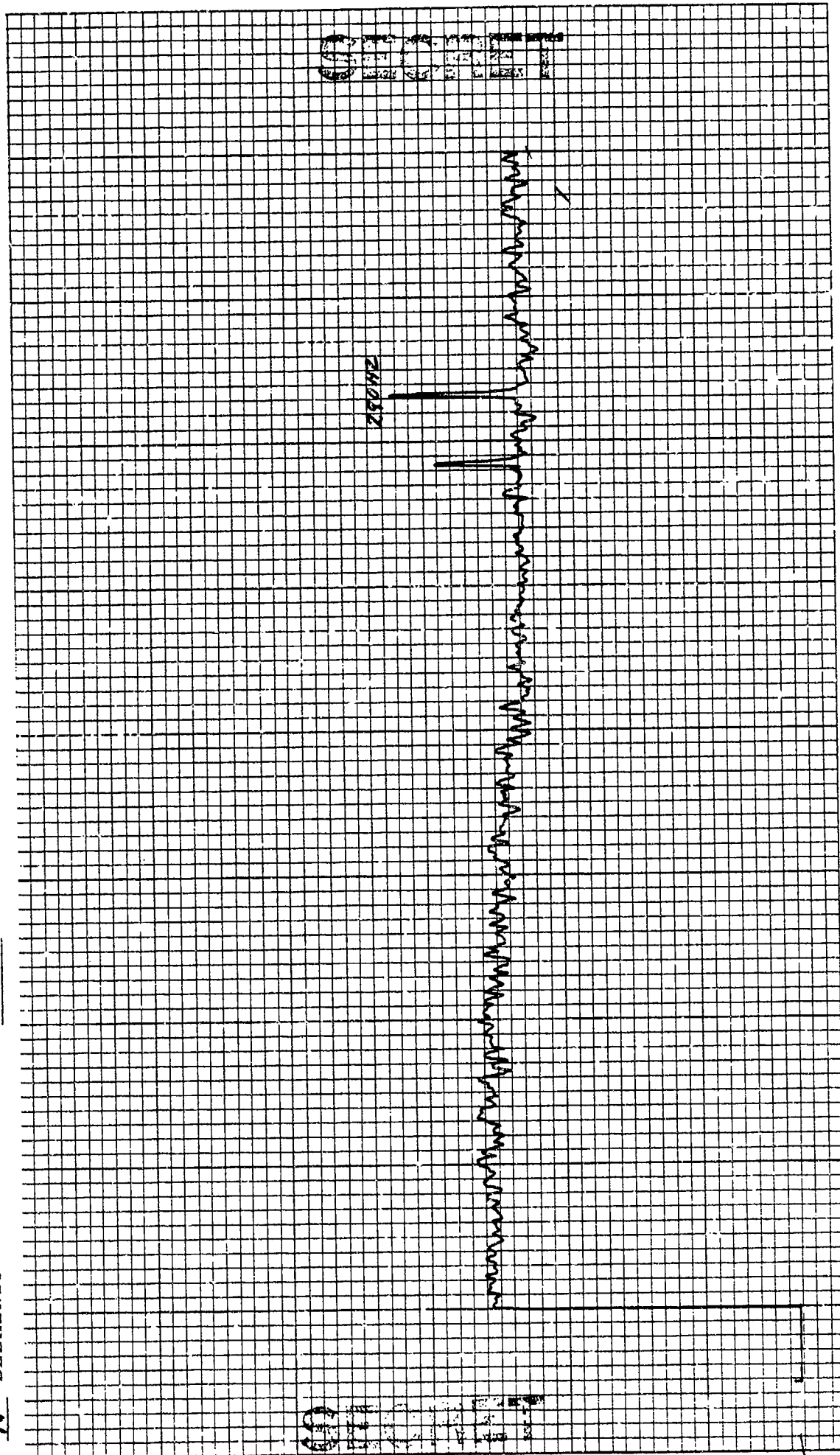
REEL: 119 INDE X 1632
INTEGRATION TIME 320 SECS
ATTEN: -2 DB
FILTER WTG: HANNING



46 0703

CONTROL: 0633 - 16 (DP10)
BEAMFORMED SPECTRUM (ELEMENTS
EXERCISE: BEARING STAKE
CENTER FREQ: 290 HZ
16 ELEMENTS
DATE OF ANALYSIS: 1-6 & 9-17)
DATE/TIME: 3-16-77 - 0633 Z
ANALYSIS BANDWIDTH: 1/10 HZ
+72 DEG. AZ STEERING

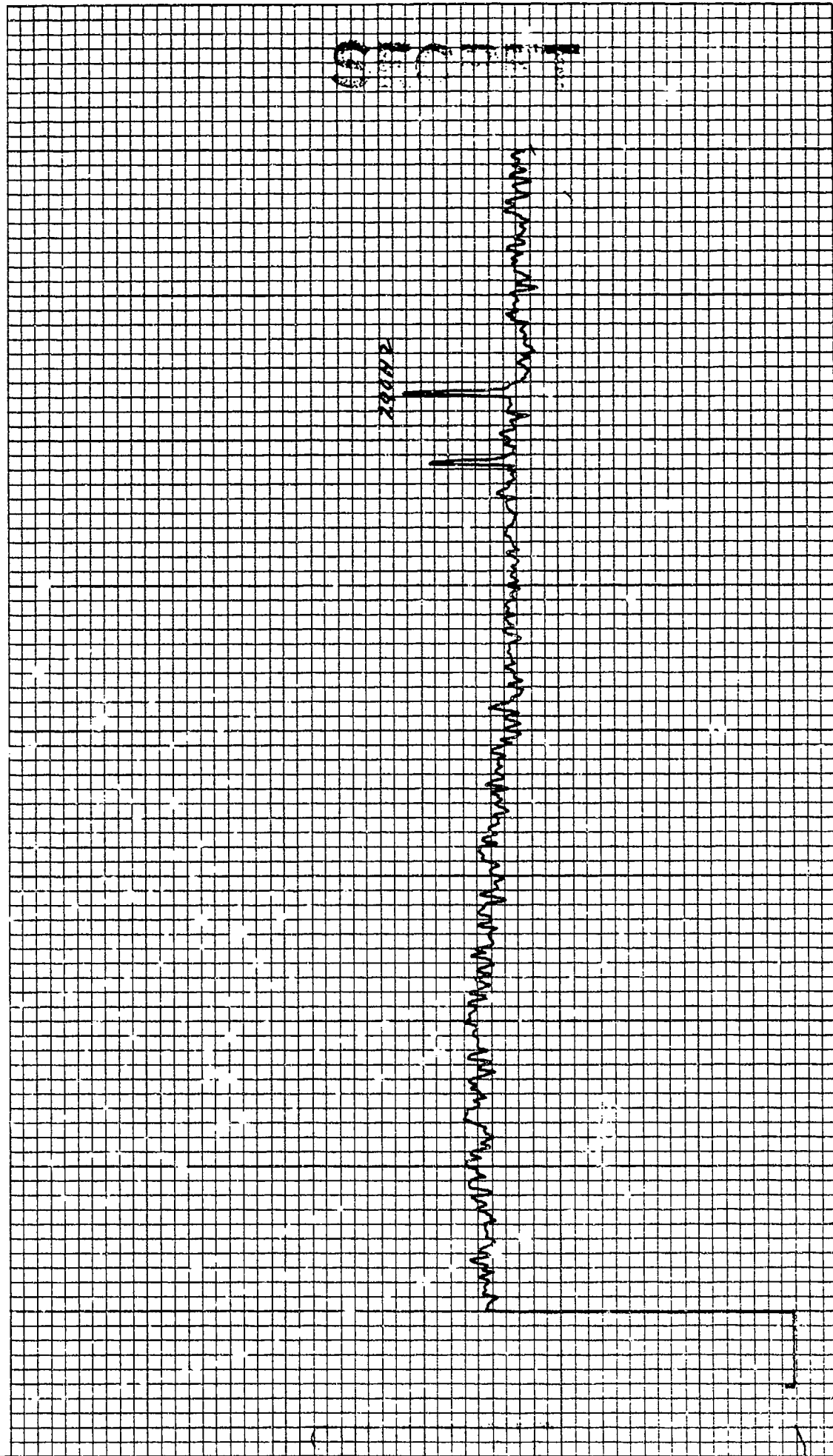
REEL: M19 INDEX X/637
INTEGRATION TIME 320 SECS ATTN: -12 DB
FILTER WTG: HANNING



K-E 10 X 10 TO THE INCH • 7 X 10 INCHES
KEUFFEL & ESSER CO. MADE IN U.S.A.

46 0703

CONTROL: 0633 - 16 (DP10)
BEAMFORMED SPECTRUM (ELEMENTS)
EXERCISE: BEARING STAKE
CENTEK FREQ: 273 HZ
16 ELEMENTS
DATE OF ANALYSIS: 1-6-77
DATE/TIME: 3-16-77 - 0633 Z
ANALYSIS BANDWIDTH: 1/10 HZ
+74 DEG. AZ STEERING
REEL: M19 INDF X/637
INTEGRATION TIME 320 SECS
ATTEN: -12 DB
FILTER WTG: HANNING



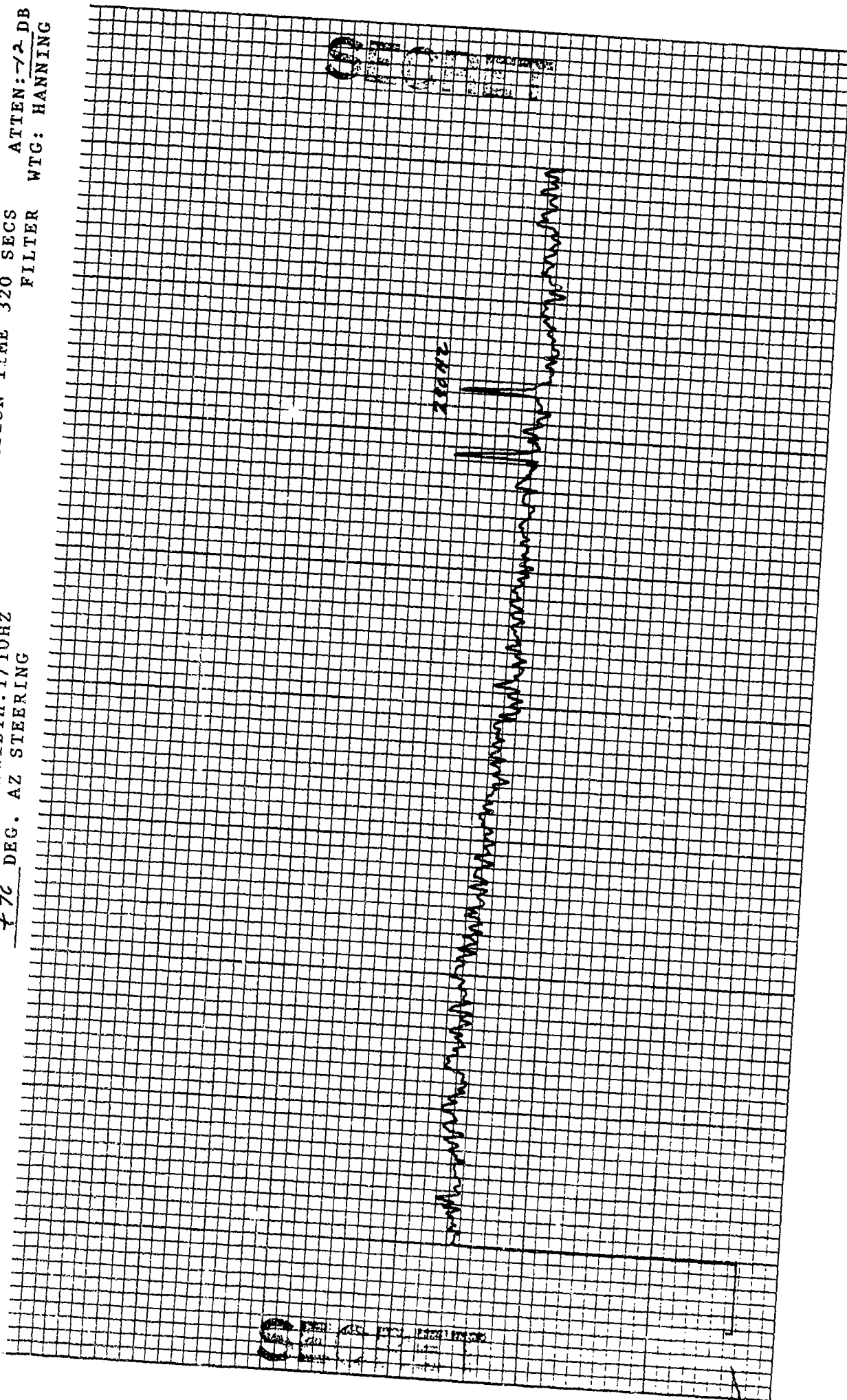
K-E 10 X 10 TO THE INCH • 7 X 10 INCHES
KEUFFEL & ESSER CO. M.D.P. IN U.S.A.

46 0703

CONTROL: 0033 - 16 (DP10)
BEAMFORMED SPECTRUM (ELEMENTS)
EXERCISE: BEARING STAKE
CENTER FREQ: 270 HZ
16 ELEMENTS

DATE OF ANALYSIS: 1-6-77
DATE/TIME: 3-16-77 - 0633 Z
ANALYSIS BANDWIDTH: 1/10 HZ
+ 70 DEG. AZ STEERING

REEL: 149
INTEGRATION TIME 320 SECS
FILTER
ATTEN: -72 DB
WTG: HANNING
INDE X 1637



CONFIDENTIAL

SIGNAL LEVEL AND SNR
CALCULATIONS

DATA POINT 10

FREQUENCY 140 HZ

NUMBER OF ELEMENTS 32

SIGNAL LEVEL

MCPS-32 SIGNAL LEVEL INDICATED	<u>-18.4</u>	
MCPS-32 CAL. CORRECTION	<u>+10</u>	-8.4
BEAMFORMER GAIN	<u>+18</u>	+10.4 SIG. LEVEL FOR SNR CALCULATION
MRA CORRECTION	<u>+ .2</u>	+10.2 SIG. LEVEL FOR SIGNAL GAIN

NOISE LEVEL

MCPS-32 SIGNAL LEVEL INDICATED	<u>-50.0</u>	
MCPS-32 CAL. CORRECTION	<u>+10</u>	-40.0
BEAMFORMER GAIN	<u>+18</u>	-22.0 NOISE LEVEL FOR SNR CALCULATION

SIGNAL-NOISE-RATIO

SIGNAL LEVEL FOR SNR	<u>+10.4</u>	
SIGNAL LEVEL FOR SNR	<u>-22.0</u>	32.4
PROCESSOR CORRECTION	<u>-4.0</u>	28.4
MRA CORRECTION	<u>+ .2</u>	28.6 SNR 1/10 HZ BAND
BANDWIDTH CONVERSION	<u>-8.2</u>	20.4 SNR 1 HZ BAND

CONFIDENTIAL

~~CONFIDENTIAL~~

SIGNAL LEVEL AND SNR

CALCULATIONS

DATA POINT 10

FREQUENCY 290 HZ

NUMBER OF ELEMENTS 32

SIGNAL LEVEL

MCPS-32 SIGNAL LEVEL INDICATED -35.8

MCPS-32 CAL. CORRECTION +10 -25.8

BEAMFORMER GAIN +18 -7.8

SIG. LEVEL FOR SNR CALCULATION

MRA CORRECTION

+ .9 -6.9

SIG. LEVEL FOR SIGNAL GAIN

NOISE LEVEL

MCPS-32 SIGNAL LEVEL INDICATED -59.8

MCPS-32 CAL. CORRECTION +10 -49.8

BEAMFORMER GAIN

+18 -31.8

NOISE LEVEL FOR SNR CALCULATION

SIGNAL-NOISE-RATIO

SIGNAL LEVEL FOR SNR -7.8

SIGNAL LEVEL FOR SNR -31.8 24.0

PROCESSOR CORRECTION -4.0 20.0

MRA CORRECTION

+ .9 20.9

SNR 1/10 HZ BAND

BANDWIDTH CONVERSION

-8.2 12.7

SNR 1 HZ BAND

CONFIDENTIAL

CONFIDENTIAL

DATA POINT 10

SIGNAL GAIN

	<u>140 HZ</u>	<u>290HZ</u>	<u>295HZ</u>
MEAN OMNI SIGNAL LEVEL	<u>-23.3</u>	<u>-38.0</u>	<u> </u>
MRA SIGNAL LEVEL	<u>+10.6</u>	<u>-6.4</u>	<u> </u>
ARRAY SIGNAL GAIN	<u>33.9</u>	<u>31.1</u>	<u> </u>
20 LOG <u>32</u>	<u>30.1</u>	<u>30.1</u>	<u> </u>
# of elements			
DIFFERENCE	<u>+3.8</u>	<u>+1.0</u>	<u> </u>

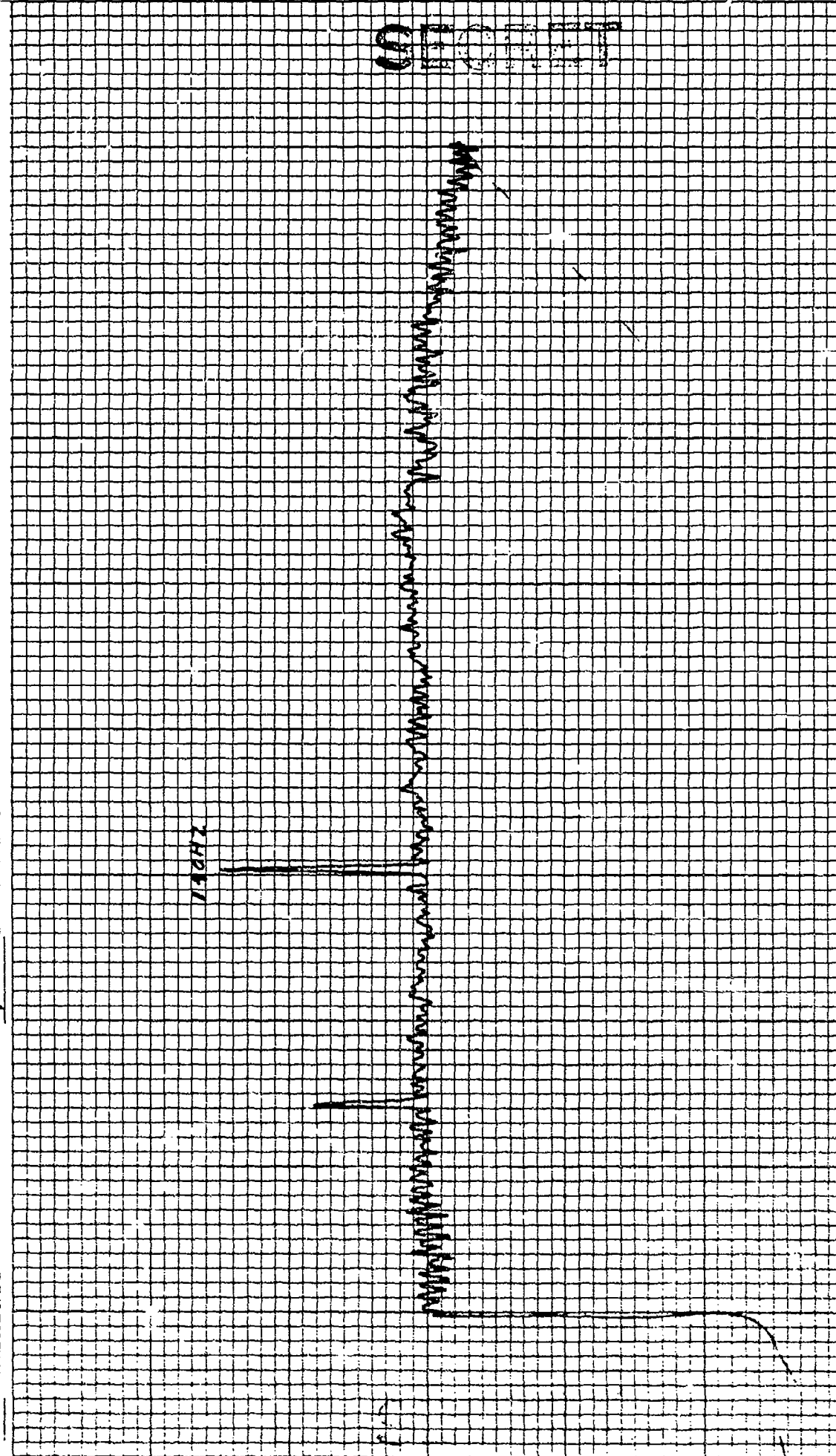
ARRAY GAIN

MRA SNR	<u>28.6</u>	<u>20.9</u>	<u> </u>
MEAN OMNI SNR	<u>18.7</u>	<u>8.4</u>	<u> </u>
ARRAY GAIN	<u>9.9</u>	<u>11.5</u>	<u> </u>
THEORETICAL AZMUTH GAIN (at MRA)	<u>10.8</u>	<u>17.4</u>	<u> </u>
DIFFERENCE	<u>- .9</u>	<u>- 1.9</u>	<u> </u>

KSE 10 X 10 TO THE INCH = 7 X 10 INCHES
KEUPPEL & ESSER CO. MADE IN U.S.A.

46 0703

CONTROL: 0633 - 32 (DP10) DATE OF ANALYSIS: 1-6-79-264 28-35) REEL: M11 INDE X/632
BEAMFORMED SPECTRUM (ELEMENTS) DATE/TIME: 3-6-77 - 0633 Z INTEGRATION TIME 320 SECS ATTN: -70 DB
EXERCISE: BEARING STAKE ANALYSIS BANDWIDTH: 1/10HZ FILTER WTG: HANNING
CENTER FREQ: 150 HZ 54 DEG. AZ STEERING



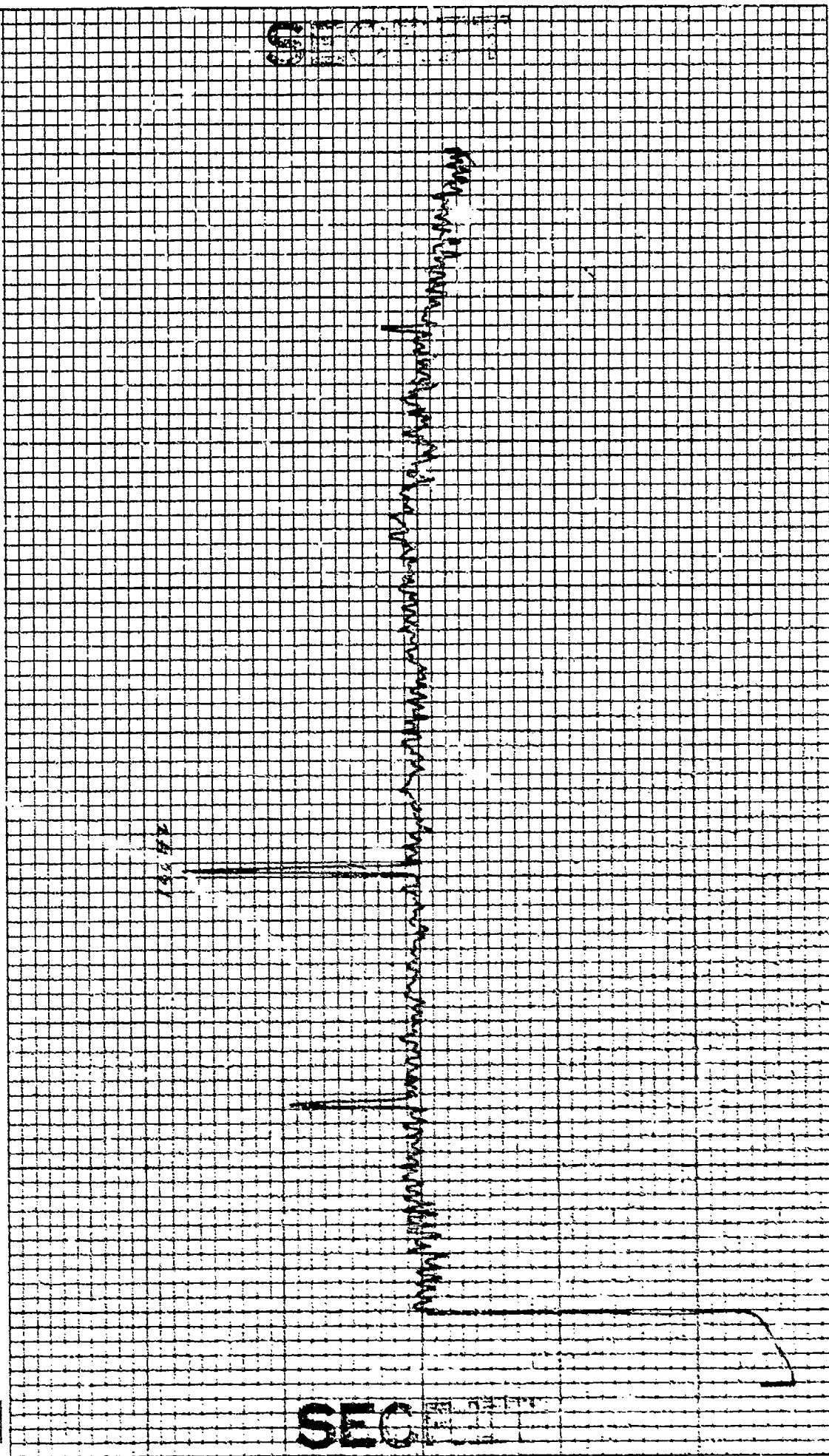
KOE 10 X 10 TO THE INCH • 7 X 10 INCHES
KEUTYL & ESSER CO. MADE IN U.S.A.

46 0703

CONTROL: 0633 - 32 (DP16)
BEAMFORMED SPECTRUM (ELEMENTS)
EXERCISE: BEARING STAKE
CENTER FREQ: 150 HZ
32 ELEMENTS

DATE OF ANALYSIS: 1-64 9-26 4 29-35
DATE/TIME: 376.77 - 0633 Z
ANALYSIS BANDWIDTH: 1/10 HZ
+ 56 DEG. AZ STEERING

REEL: MIQ
INTEGRATION TIME 320 SECS
FILTER
ATTEN: -18 DB
WTG: HANNING
INDE X107



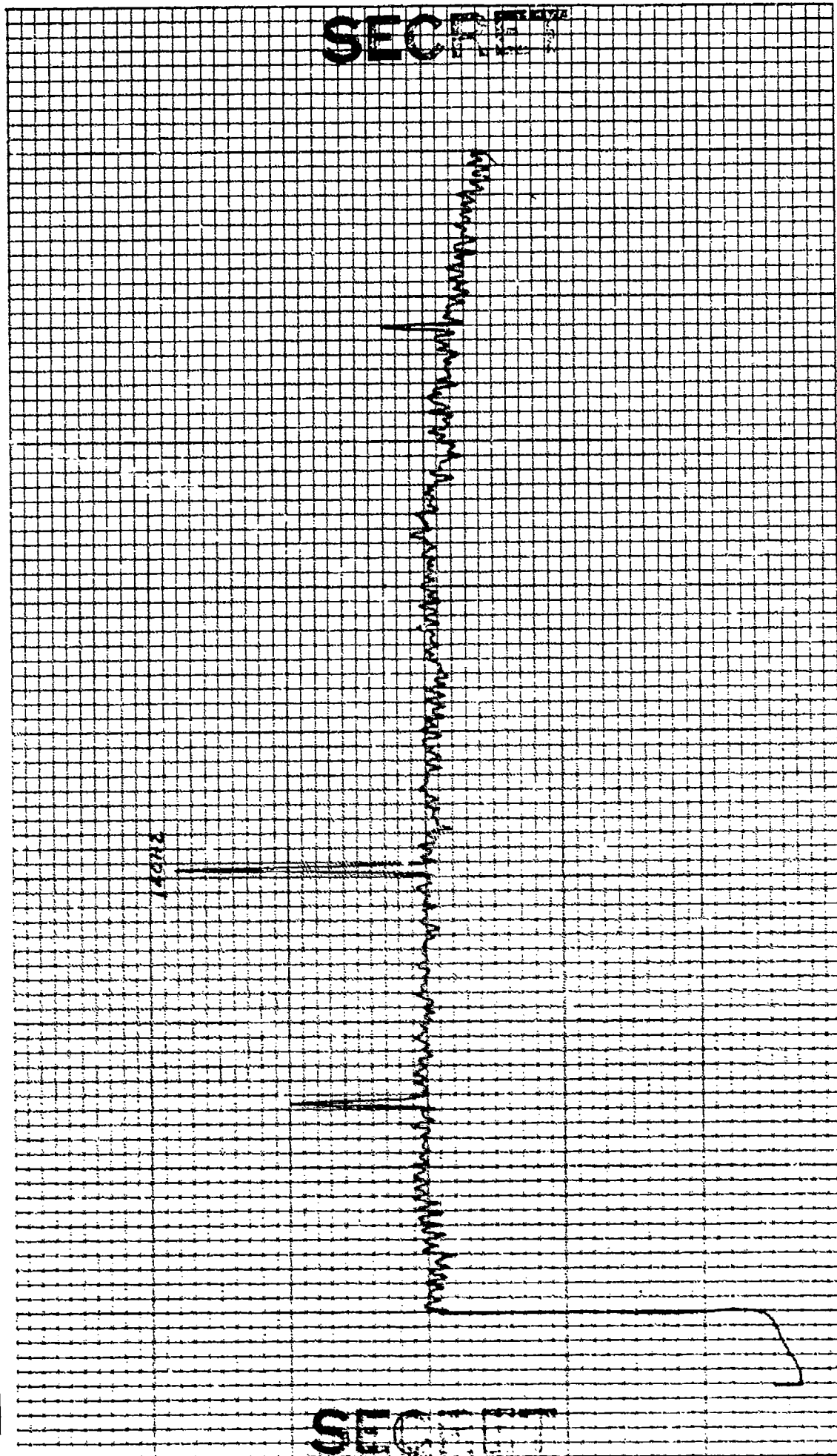
KOE 10 X 10 TO THE INCH 10 X 10 INCHES
RELIABLE DESIGN CO. 10000 0011

46 0703

CONTROL: 0077 - 72 (DP14)
BEAMFORMED SPECTRUM (ELEMENTS)
EXERCISE: BEARING STAKE
CENTER FREQ: 150 HZ
72 ELEMENTS

DATE OF ANALYSIS: 1-6-80-28-35
DATE/TIME: 7-6-77 - 0332
ANALYSIS BANDWIDTH: 1/10HZ
+50 DEG. AZ STEERING

REEL: H19 INDE X637
INTEGRATION TIME 320 SECS
ATTEN: -18 DB
FILTER WTG: HANNING



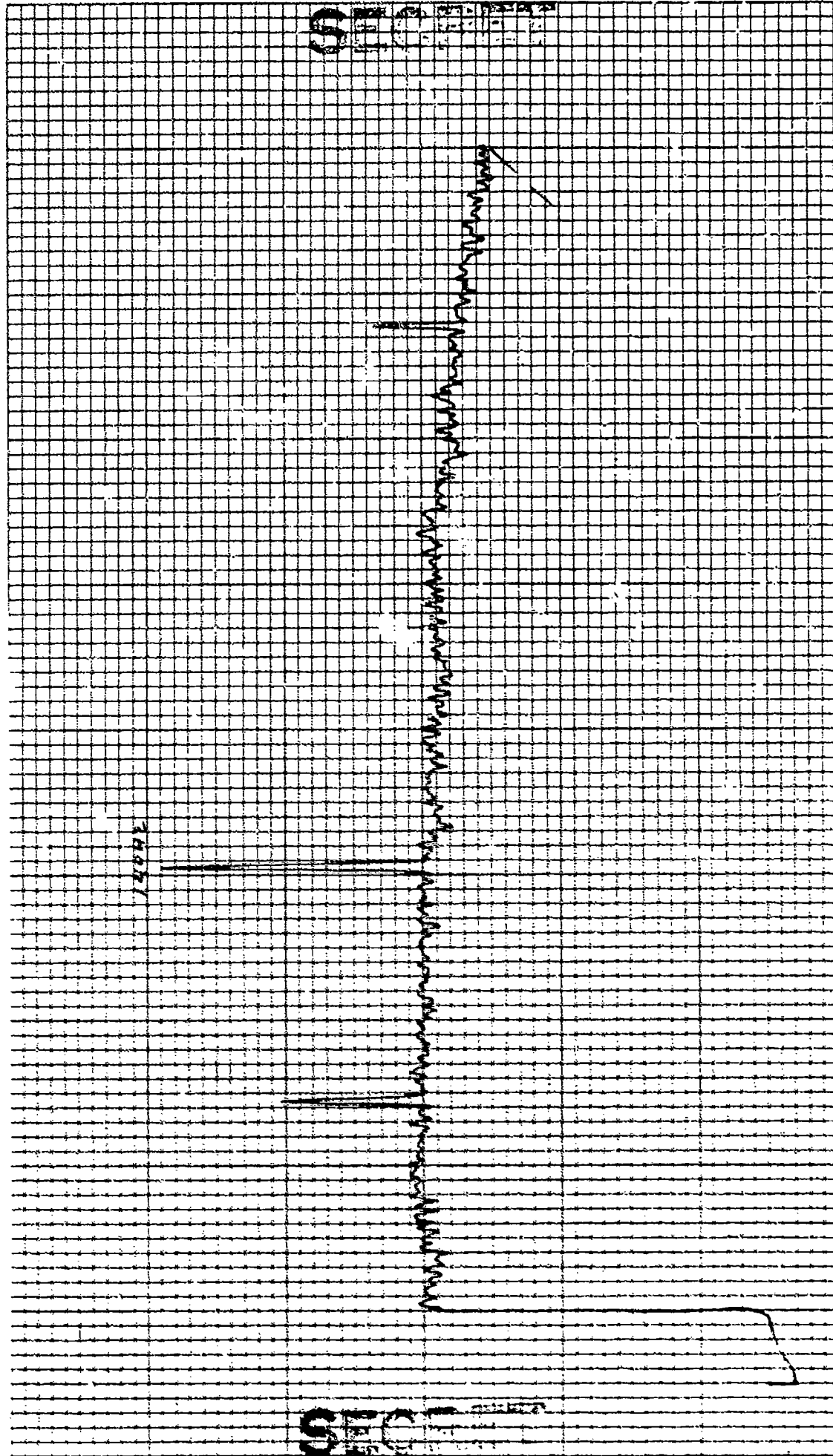
10 X 10 TO THE INCH • 7 X 10 INCHES
KUPPER & ESSLER CO. MADE IN U.S.A.

45 0703

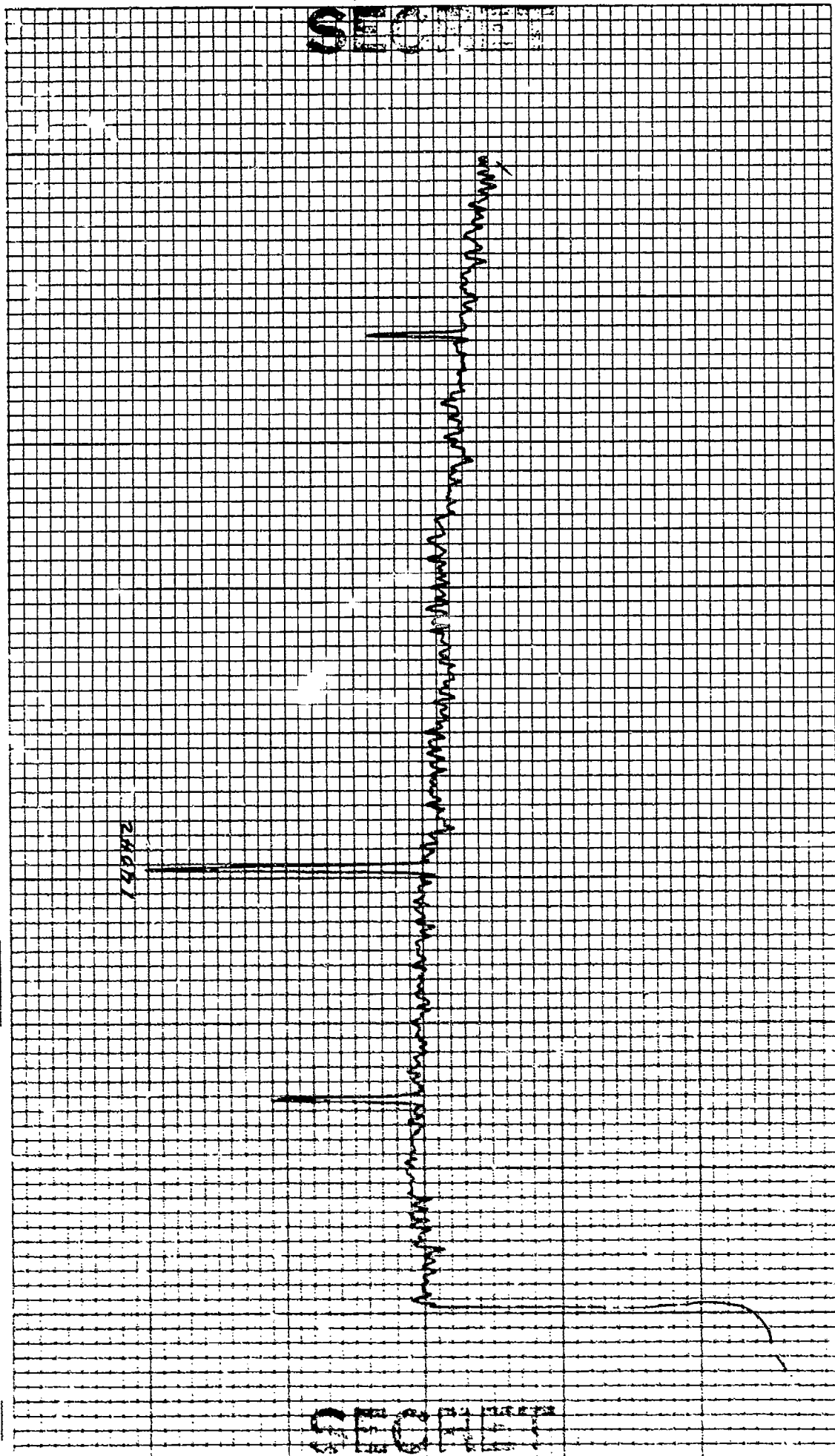
CONTROL: 0633 - 32 (2010) DATE OF ANALYSIS: 1-68 9-26 8 20-35
BEAMFORMED SPECTRUM (ELEMENTS) DATE/TIME: 3-67 2-0633 Z
EXERCISE: BEARING STAKE ANALYSIS BANDWIDTH: 1/10 HZ
CENTER FREQ: 150 HZ
72 ELEMENTS 460 DEG. AZ STEERING

REEL: M15 INDE X/632

INTEGRATION TIME 320 SECS
ATTEN: -18 DB
FILTER WTG: HANNING



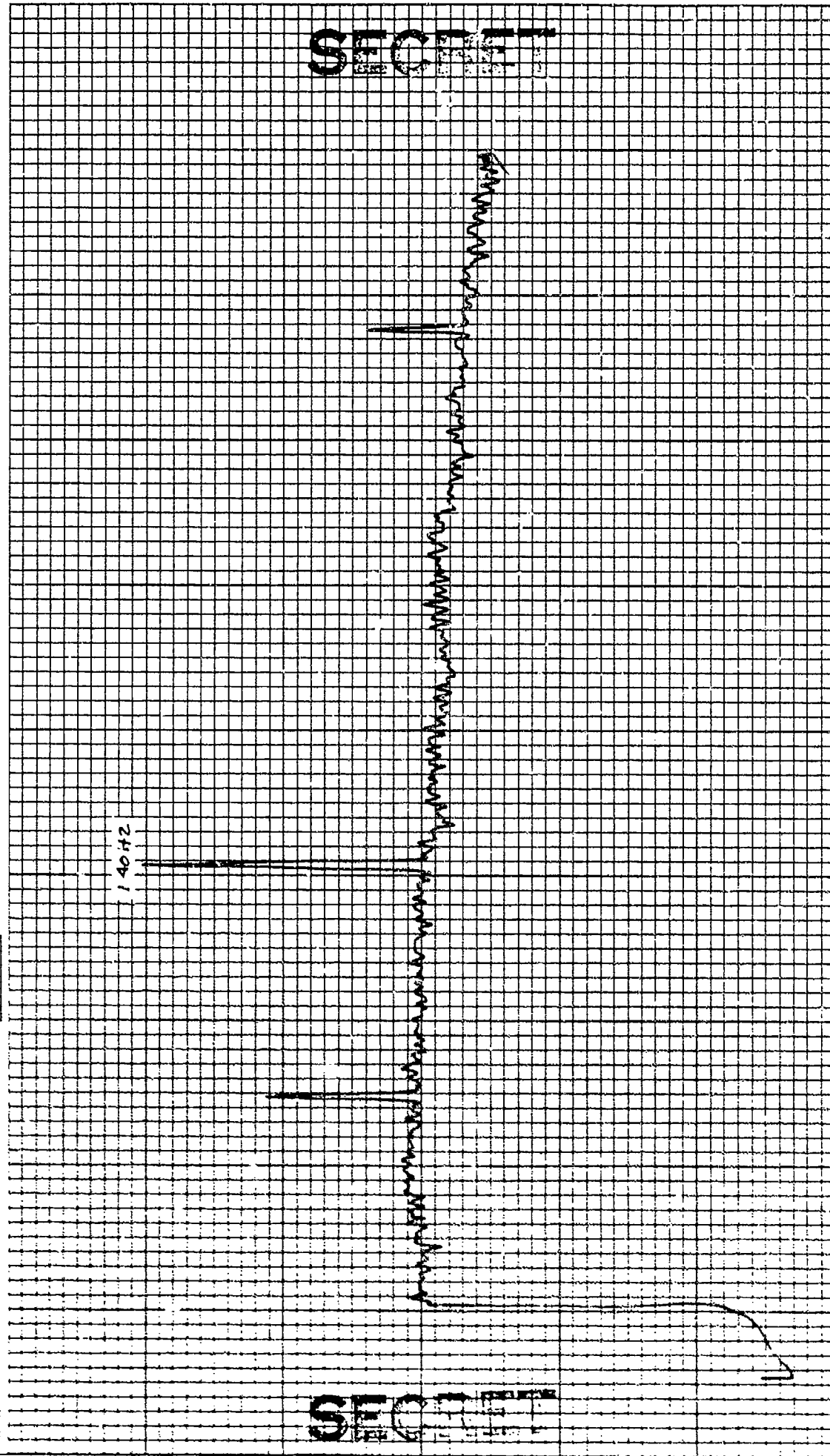
CONTROL: 0633 - 32 (0810) DATE OF ANALYSIS: 1-6-79-26-28-35
 BEAMFORMED SPECTRUM (ELEMENTS) DATE/TIME: 376-77-0633 Z
 EXERCISE: BEARING STAKE ANALYSIS BANDWIDTH: 1/10HZ
 CENTER FREQ: 270 HZ
 32 ELEMENTS
 REEL: 118 INDE X1637
 INTEGRATION TIME 320 SECS ATEN: 10 DB
 FILTER WTG: HANNING



K-E 10 X 10 TO THE INCH • 7 X 10 INCHES
NEUPPEL & ESSER CO. MADE IN U.S.A.

46 0703

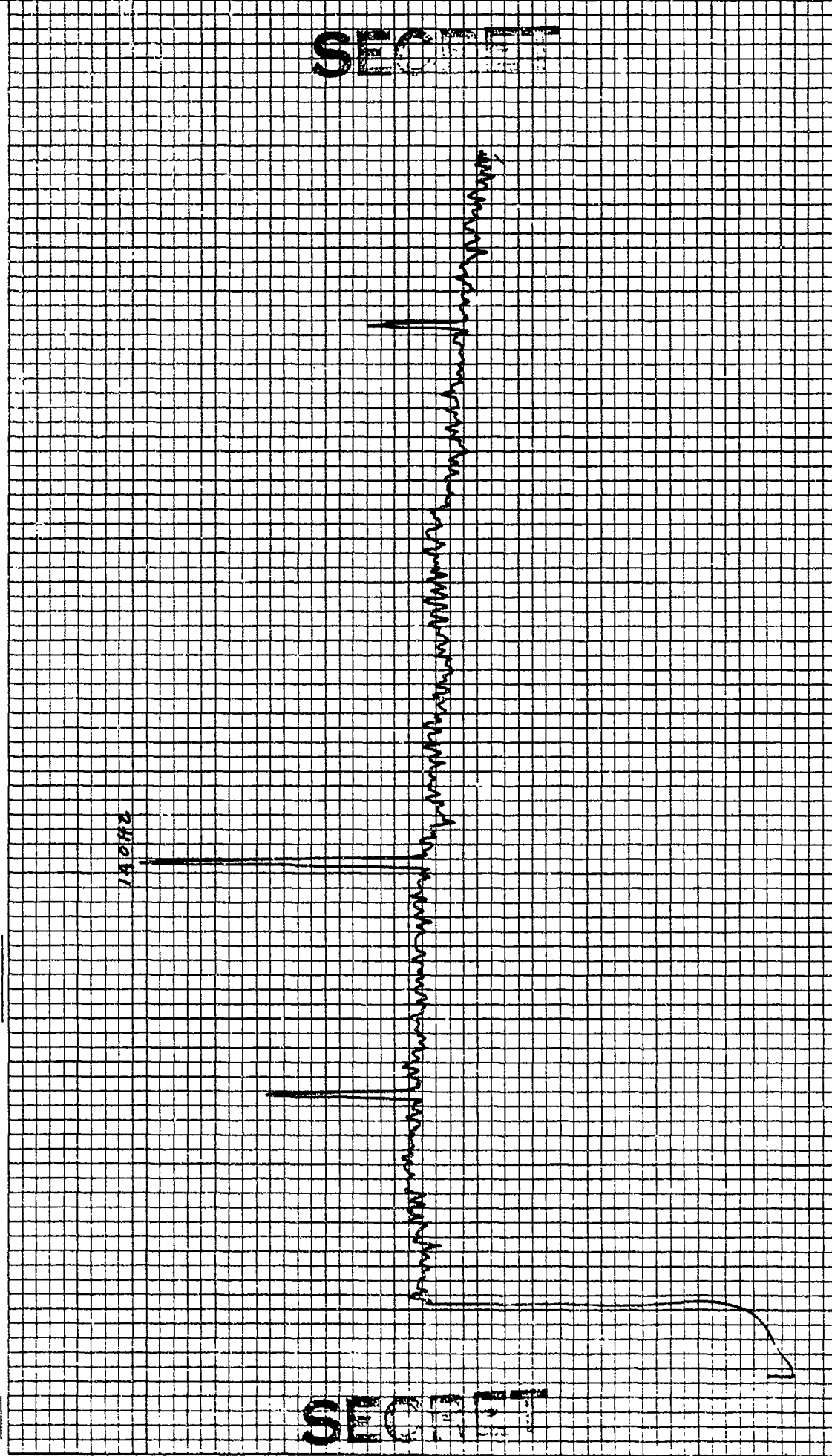
CONTROL: 0633 - 32 (D810) DATE OF ANALYSIS: 1-6-77-26-438-35 INDE X1637
BEAMFORMED SPECTRUM (ELEMENTS) DATE/TIME: 3-16-77-0633 Z INTEGRATION TIME 320 SECS ATTEN: 70 DB
EXERCISE: BEARING STAKE ANALYSIS BANDWIDTH: 1/10HZ FILTER WTG: HANNING
CENTER FREQ: 150 HZ
32 ELEMENTS +66.25 DEG. AZ STEERING



KOE 16 X 10 TO THE INCH 7 X 10 INCHES
KEUFFEL & ESSER CO. MADE IN U.S.A.

46 0703

CONTROL: 062 - 32 (DP2) DATE OF ANALYSIS: - - - - - INDE X/637
BEAMFORMED SPECTRUM(ELEMENTS) 1-648-264 29-35) REEL: M19
EXERCISE: BEARING STAKE DATE/TIME: 3-6-77 - 0633Z INTEGRATION TIME 320 SECS ATEN: -10 DB
CENTER FREQ: 150 HZ ANALYSIS BANDWIDTH: 1/10HZ FILTER WTG: HANNING
32 ELEMENTS +6.5 DEG. AZ STEERING



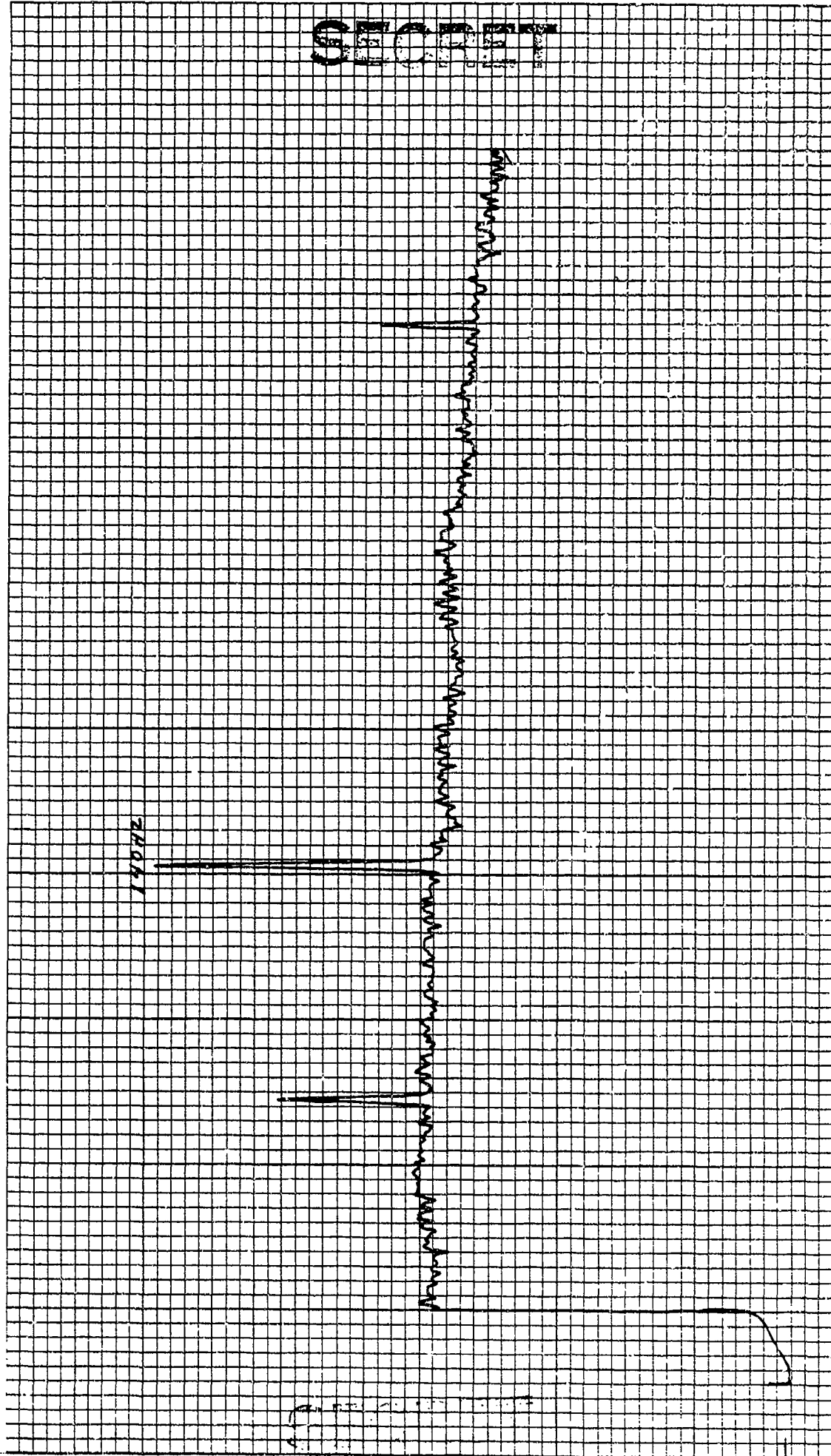
KOE 10 X 10 TO THE INCH • 7 X 10 INCHES
KEUFFEL & ESSER CO. MADE IN U.S.A.

46 0702

CONTROL: 0633 - 32 (DP10) DATE OF ANALYSIS: - - -
BEAMFORMED SPECTRUM (ELEMENTS 1-6 & 8-26 & 28-35)
EXERCISE: BEARING STAKE DATE/TIME: 3-16-77 - 0633 Z
CENTER FREQ: 150 HZ ANALYSIS BANDWIDTH: 1/10 HZ
32 ELEMENTS + 62 DEG. AZ STEERING

REEL: 119 INDE X 1637

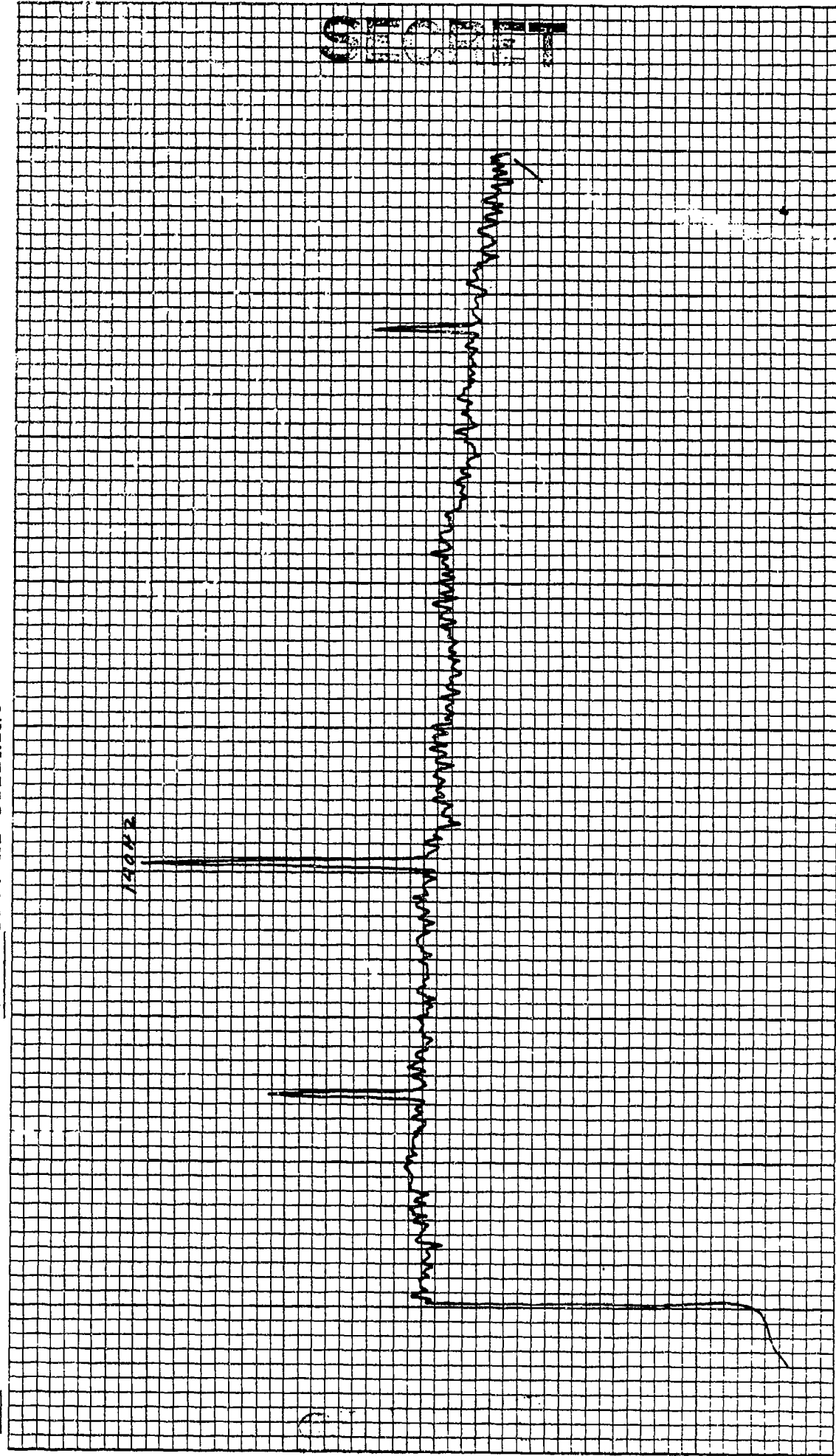
INTEGRATION TIME 320 SECS ATTN: -10 DB
FILTER WTG: HANNING



46 0703

DATE OF ANALYSIS: 1-669-26488-35)
DATE/TIME: 3-16-77-0633 Z
ANALYSIS BANDWIDTH: 1/10HZ
+42.5 DEG. AZ STEERING

REEL: M19 INDEX X1637
INTEGRATION TIME 320 SECS ATTEN: -8 DB
FILTER WTC: HANNING



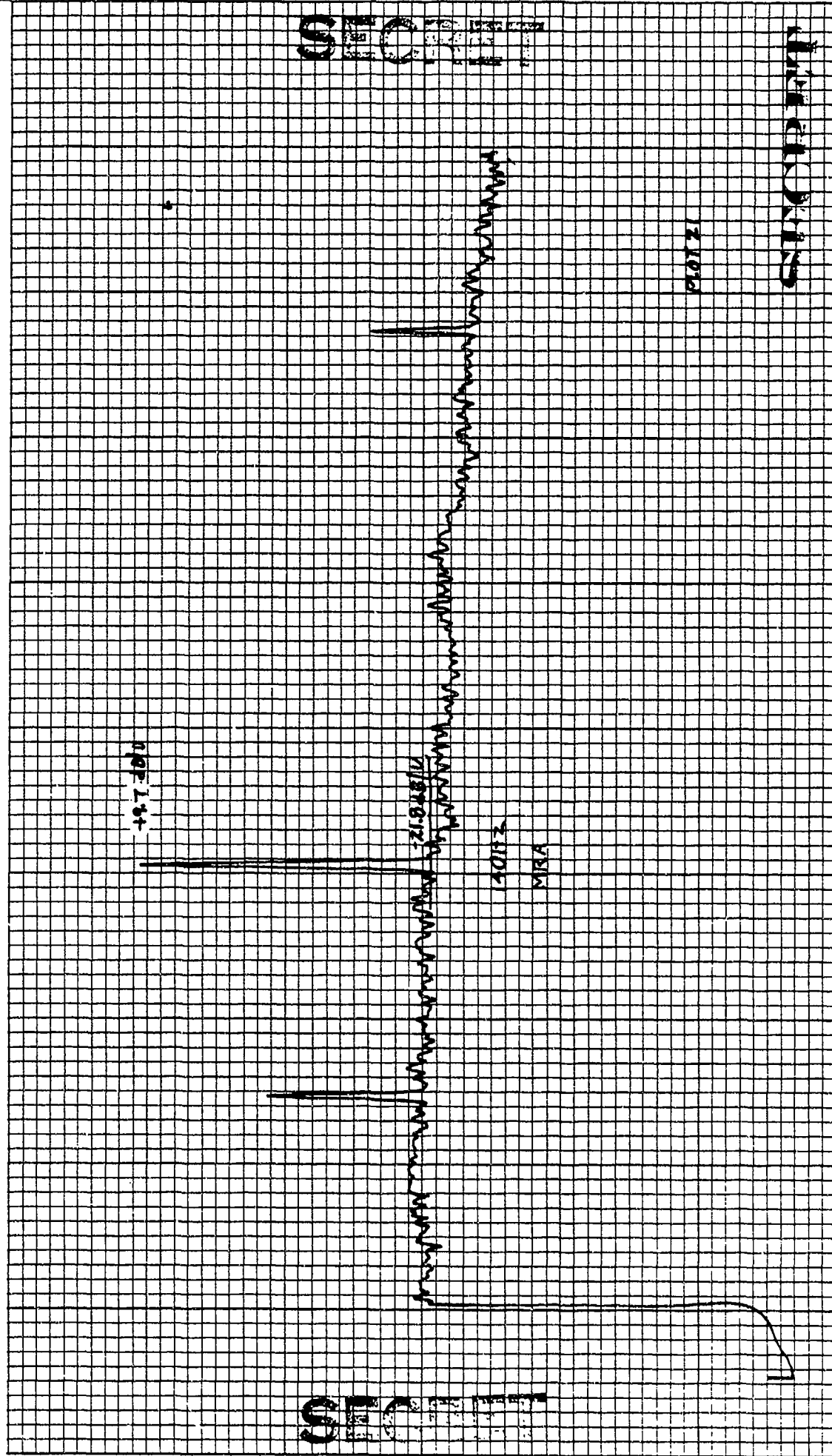
KOE 10 X 10 TO THE INCH • 7 X 10 INCHES
KEUFFEL & ESSER CO. MADE IN U.S.A.

46 0703

SECRET

CONTROL: 0633 - 49 (DP10) DATE OF ANALYSIS: _____
BEAMFORMED SPECTRUM (ELEMENTS 1706 97026 297035)
EXERCISE: BEARING STAKE
CENTER FREQ: 150 HZ
32 ELEMENTS
REEL: 419 INDE X 1637
INTEGRATION TIME 320 SECS ATTN: - DB
FILTER WTG: HANNING

DATE/TIME: 3-16-77 - 0633 Z
ANALYSIS BANDWIDTH: 1/10 HZ
+63.0 DEG. AZ STEERING



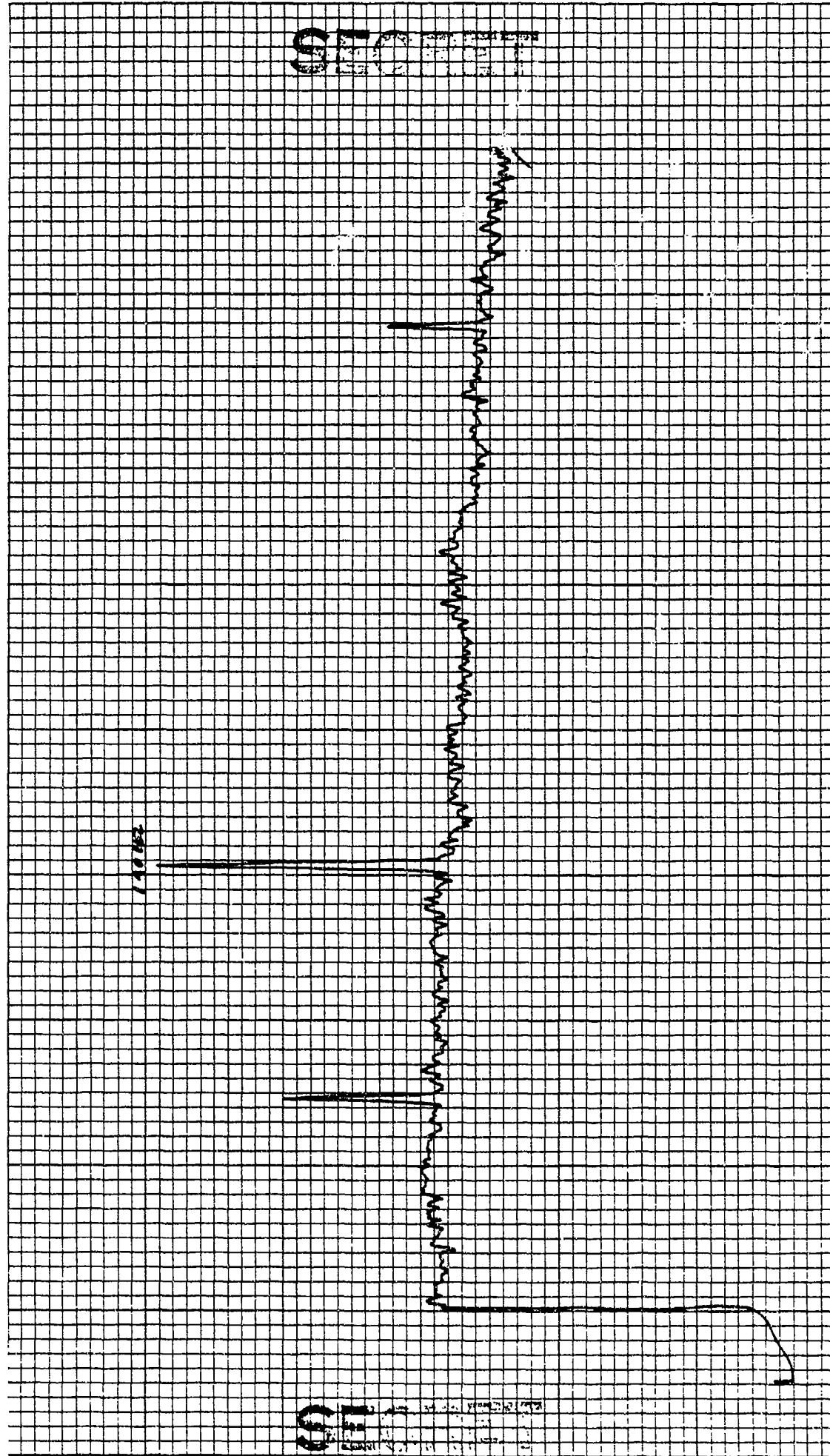
10 Hz

100 Hz

K-E 10 X 10 TO THE INCH • 7 X 10 INCHES
KEUFFEL & ESSER CO. MADE IN U.S.A.

46 0703

CONTROL: 0633 - 32 (0810) DATE OF ANALYSIS: 1-28-56 4-28-35)
BEAMFORMED SPECTRUM (ELEMENTS) REEL: M18 INDE X 1637
EXERCISE: BEARING STAKE INTEGRATION TIME 320 SECS ATTEN: -18 DB
CENTER FREQ: 150 HZ FILTER WTG: HANNING
32 ELEMENTS 469 DEG. AZ STEERING



46 0703

CONTROL: 0633-32 (DP16)
BEAMFORMED SPECTRUM(ELEMENTS
EXERCISE: BEARING STAKE
CENTER FREQ: 150 HZ
32 ELEMENTS

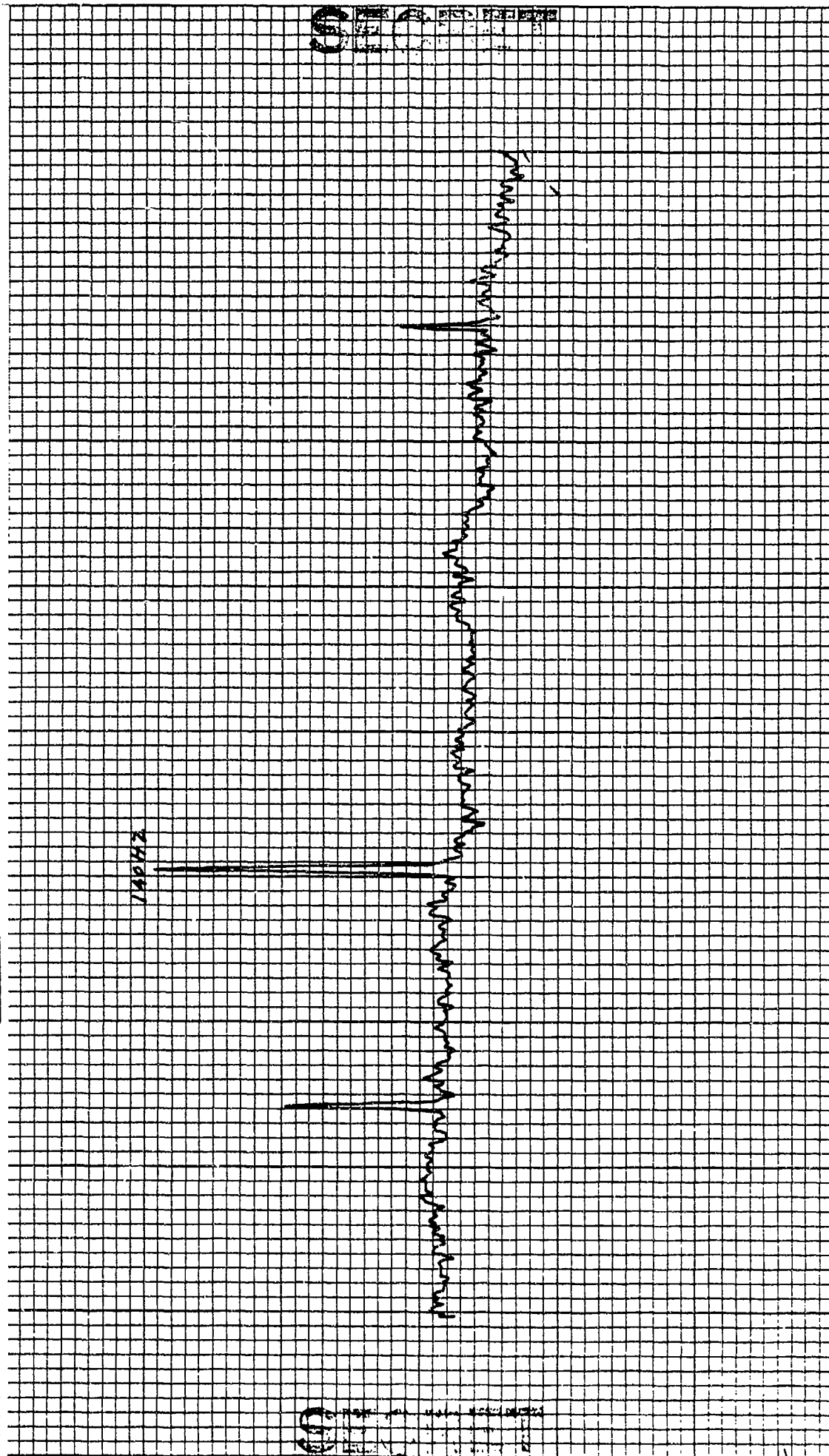
DATE OF ANALYSIS: - - - - -
1-6 48-26 428-35)

DATE/TIME: 3-16-77 - 0633 Z
ANALYSIS BANDWIDTH: 1/10 HZ
4-66 DEG. AZ STEERING

INTEGRATION TIME 320 SECS
FILTER

REEL: M19
INDEX X1637

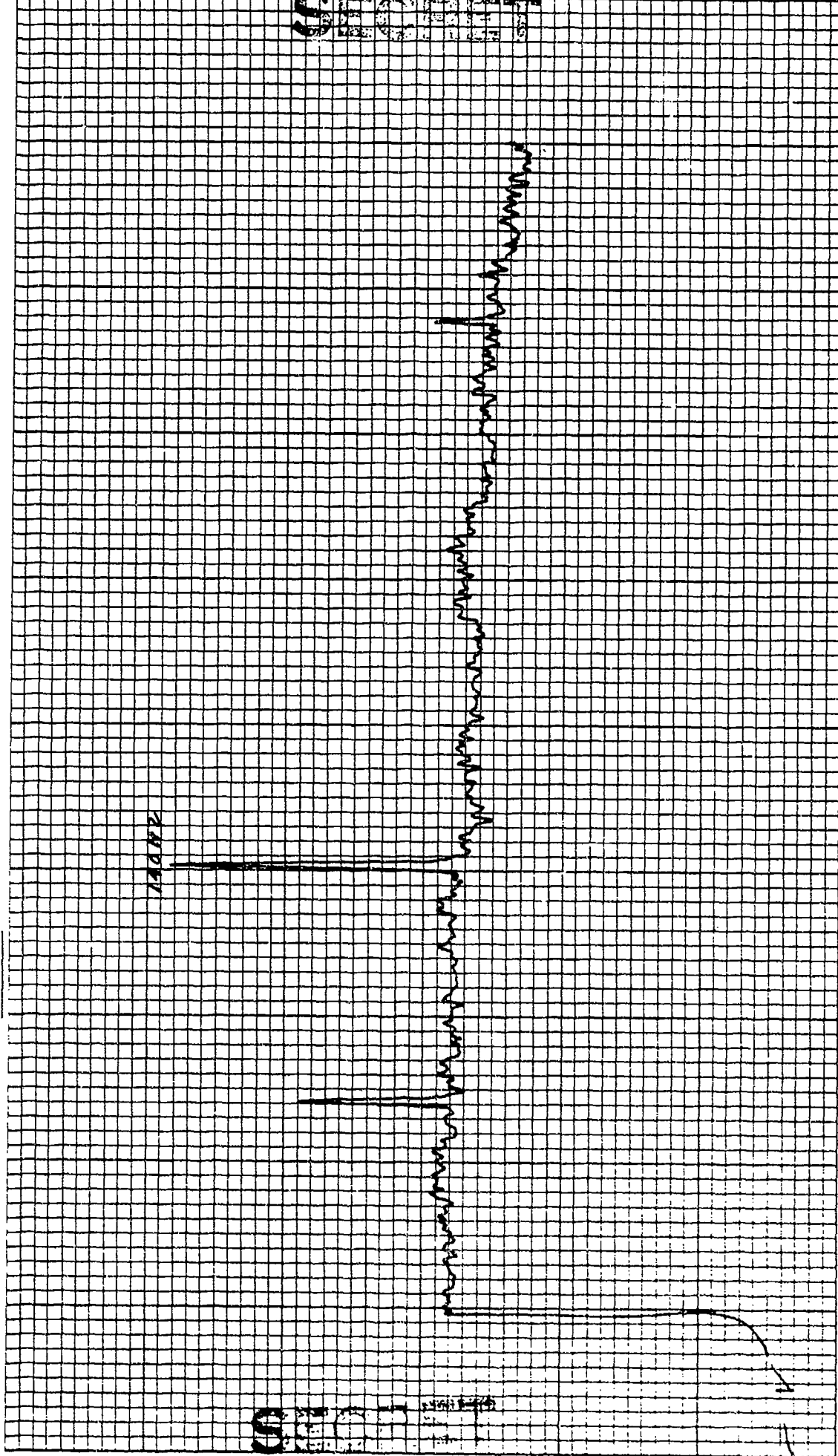
ATTN: 78 DB
WTG: HANNING



K-E 10 X 10 TO THE INCH 4.7 X 10 INCHES
KEUFFEL & ESSER CO. MADE IN U.S.A.

46 0703

CONTROL: 0633 - 32 (DP10) DATE OF ANALYSIS: 1-24-77-09-35) INDE X/637
BEAMFORMED SPECTRUM(ELEMENTS) DATE/TIME: 3-16-77-0633 Z REEL: 419
EXERCISE: BEARING STAKE ANALYSIS BANDWIDTH: 1/10HZ INTEGRATION TIME 320 SECS ATTN: -10 DB
CENTER FREQ: 150 HZ + 60 DEG. AZ STEERING FILTER WTC: HANNING
32 ELEMENTS

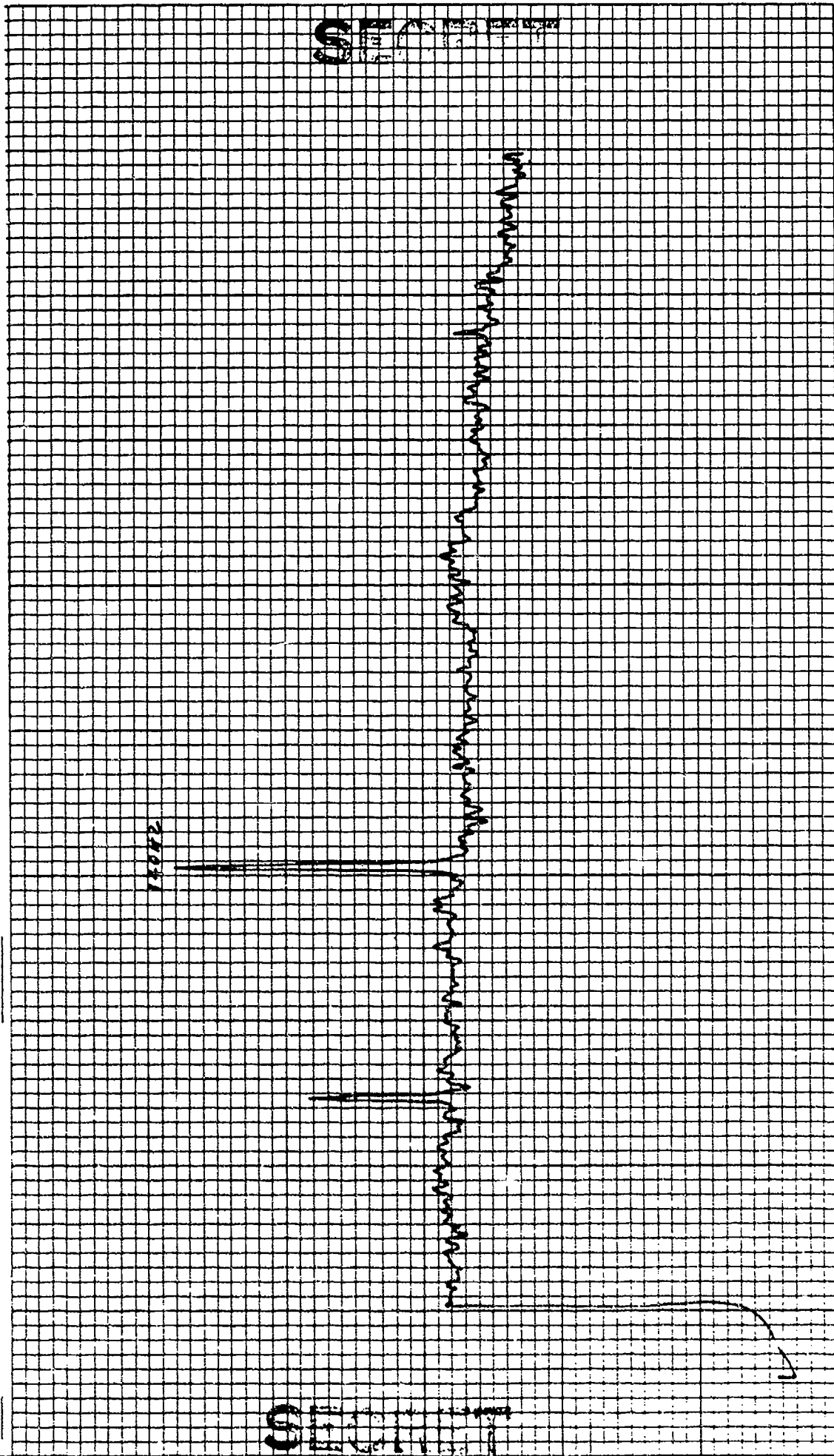


KOE 10 X 10 TO THE INCH • 7 X 10 INCHES
KELPPEL & ESSER CO. MADE IN U.S.A.

46 0703

CONTROL: 0633 - 32 (0610)
BEAMFORMED SPECTRUM (ELEMENTS 1-649-26 + 89-35)
EXERCISE: BEARING STAKE
CENTER FREQ: 150 HZ
32 ELEMENTS
DATE OF ANALYSIS: - - -
DATE/TIME: 3-16-77 - 0633 Z
ANALYSIS BANDWIDTH: 1/10 HZ
+ 72 DEG. AZ STEERING

REEL: M19
INTEGRATION TIME 320 SECS
FILTER
ATTEN: -10 DB
WTG: HANNING
INDE X1637



10 X 10 TO THE INCH • 7 X 10 INCHFS
KEUT/FL A YSSER CO. MADE IN U.S.A.

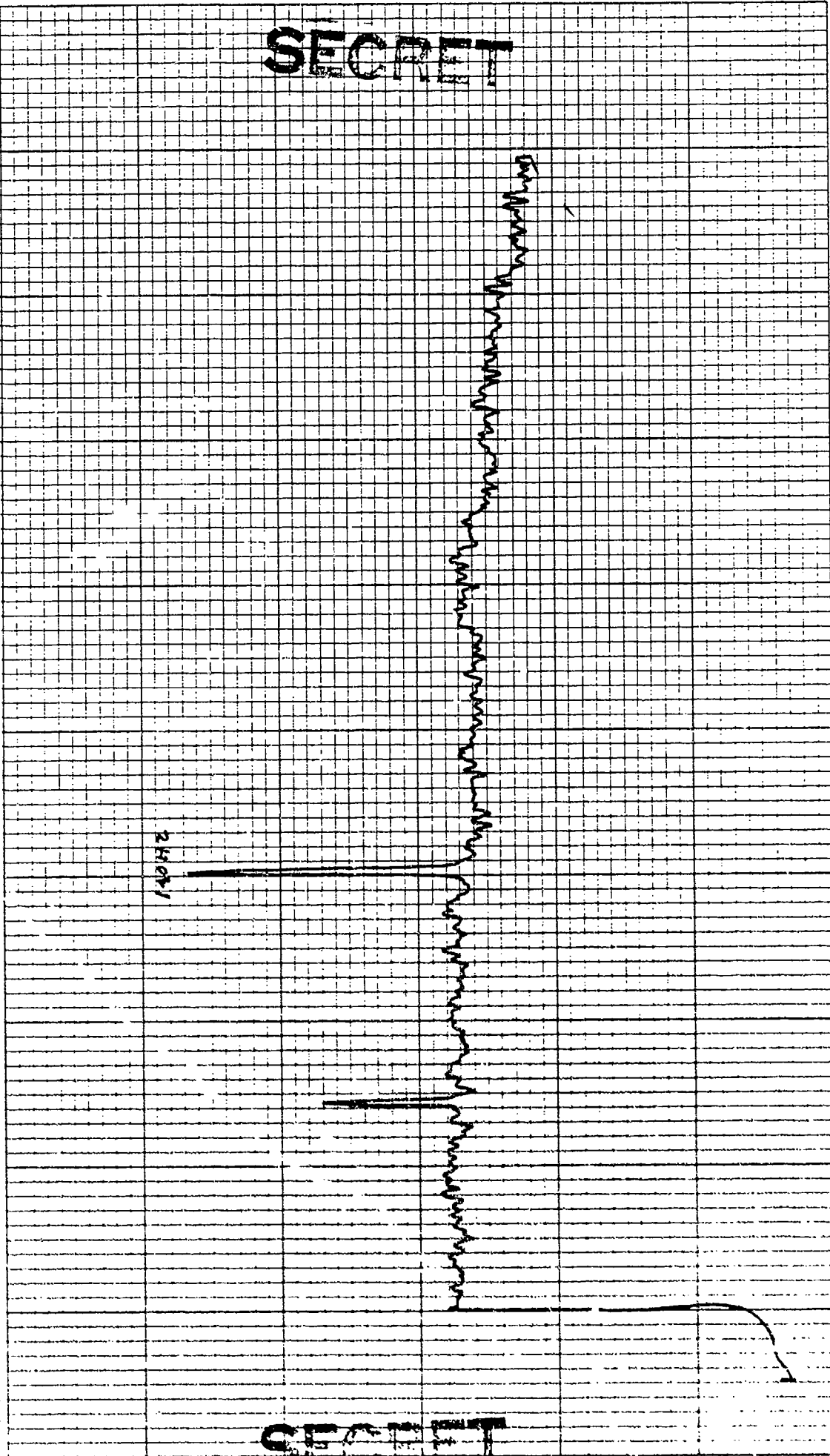
46 0703

CONTROL: 0633 - 32 (0800) DATE OF ANALYSIS: 1-6-89-26-29-35
BEAMFORMED SPECTRUM(ELEMENTS) 1-6-89-26-29-35
EXERCISE: BEARING STAKE
CENTER FREQ: 150 HZ
32 ELEMENTS

REEL: M19
INTEGRATION TIME 320 SECS
ATTEN: 7# DB
FILTER WTG: HANNING

INDE X 1637

DATE/TIME: 3-6-77-0633 Z
ANALYSIS BANDWIDTH: 1/10 HZ
+74 DEG. AZ STEERING

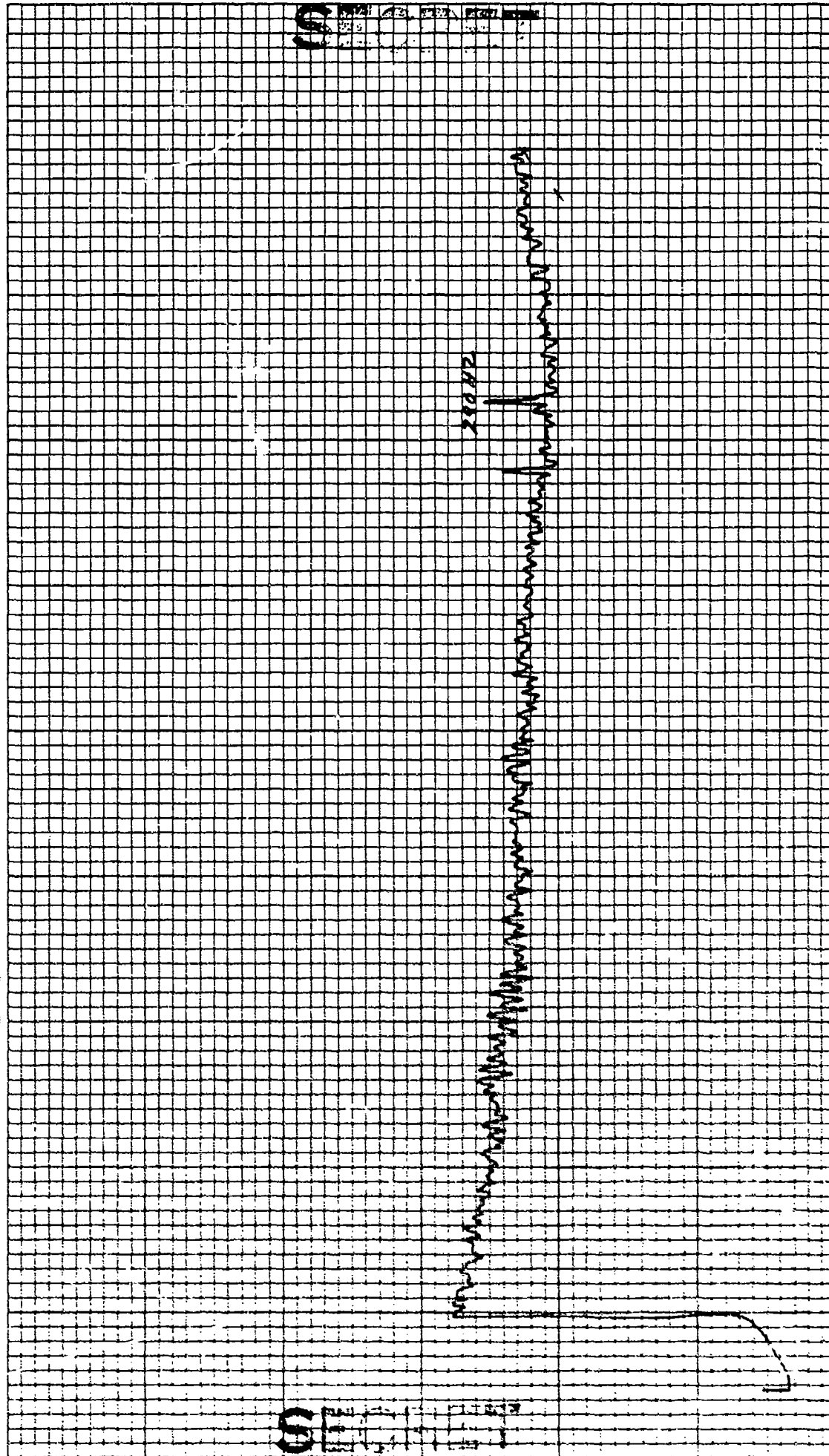


CONTROL: 0633 - 32 (2010) DATE OF ANALYSIS: - - - -
BEAMFORMED SPECTRUM (ELEMENTS) 1-6 8-26 48-35)
EXERCISE: BEARING STAKE DATE/TIME: 3-16-77 - 0633Z
CENTER FREQ: 270 HZ ANALYSIS BANDWIDTH: 1/10 HZ
32 ELEMENTS + 54 DEG. AZ STEERING

REEL: 419

INDE X 1637

INTEGRATION TIME 320 SECS
ATTEN: -18 DB
FILTER WTG: HANNING

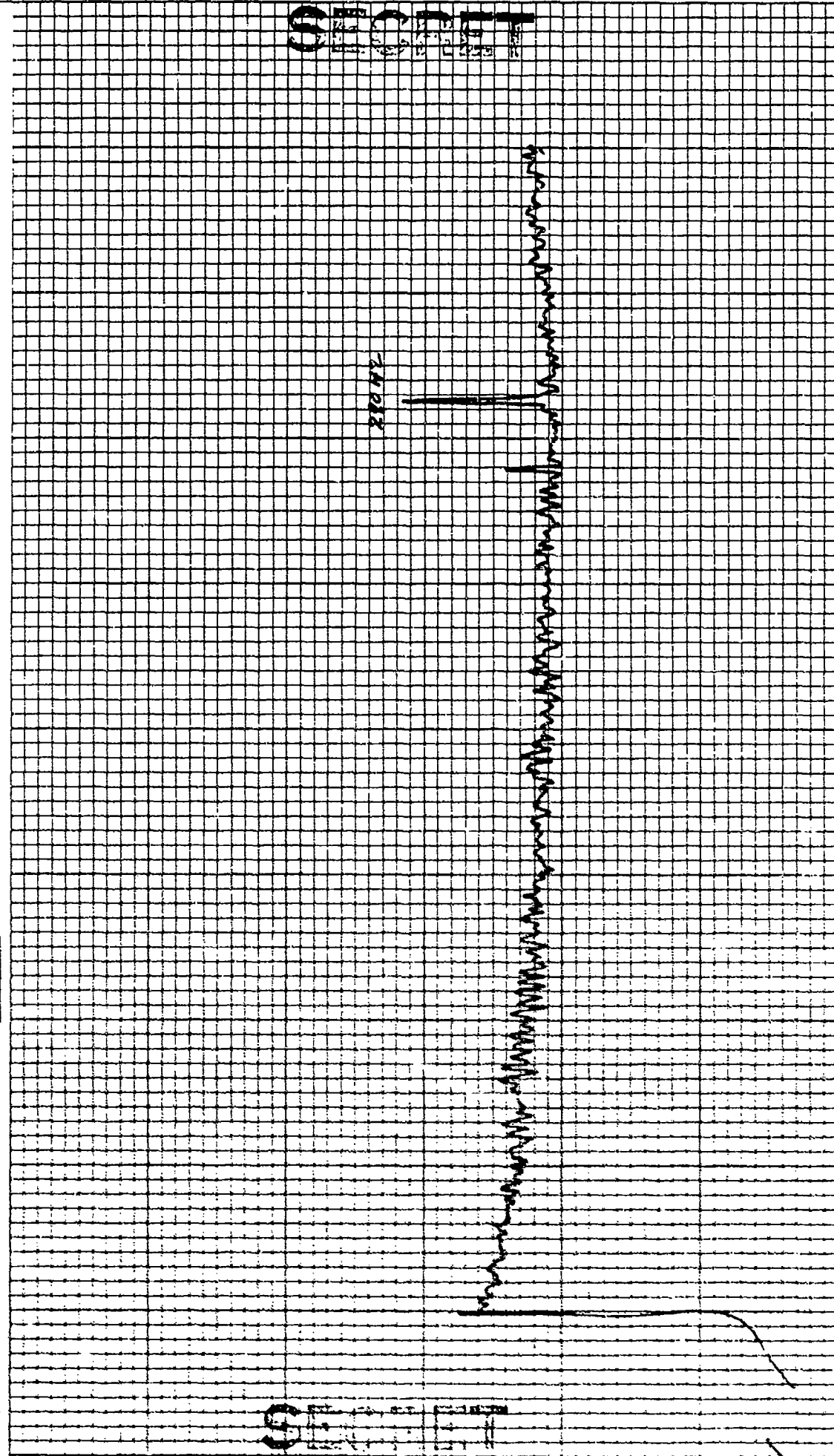


17-36
KOE 10 X 10 TO THE INCH 0.7 X 10 INCHES
NEUPPIL & ESSER CO. MADE IN U.S.A.

46 0703

CONTROL: 0633 - 32 (DP10)
BEAMFORMED SPECTRUM (ELEMENTS)
EXERCISE: BEARING STAKE
CENTER FREQ: 270 HZ
DATE OF ANALYSIS: 1-64 9-26 28-35)
DATE/TIME: 376-77 - 0633Z
ANALYSIS BANDWIDTH: 1/10HZ
+56 DEG. AZ STEERING

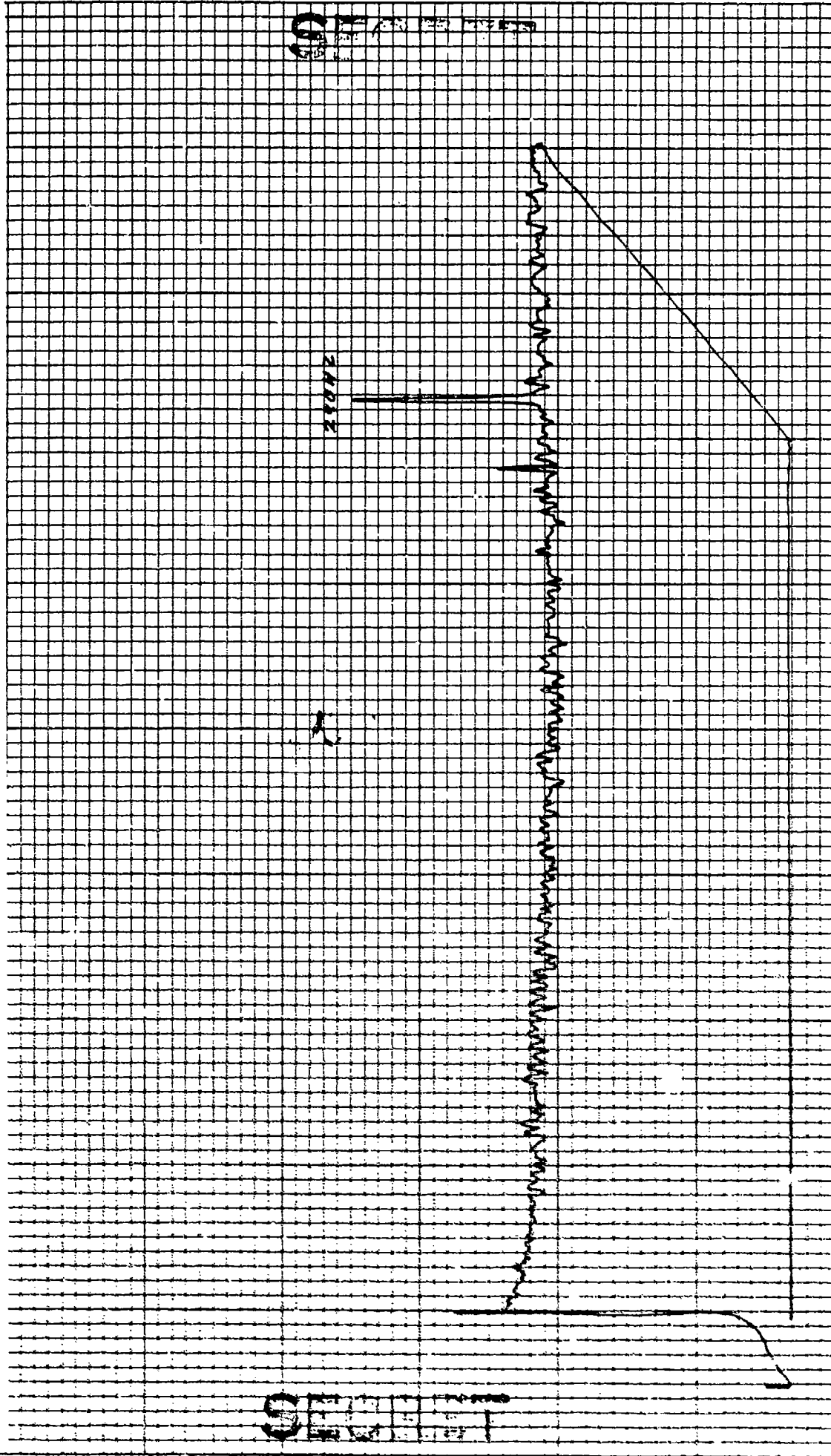
REEL: M19
INDE X1637
INTEGRATION TIME 320 SECS
ATTEN: -70 DB
FILTER
WTG: HANNING



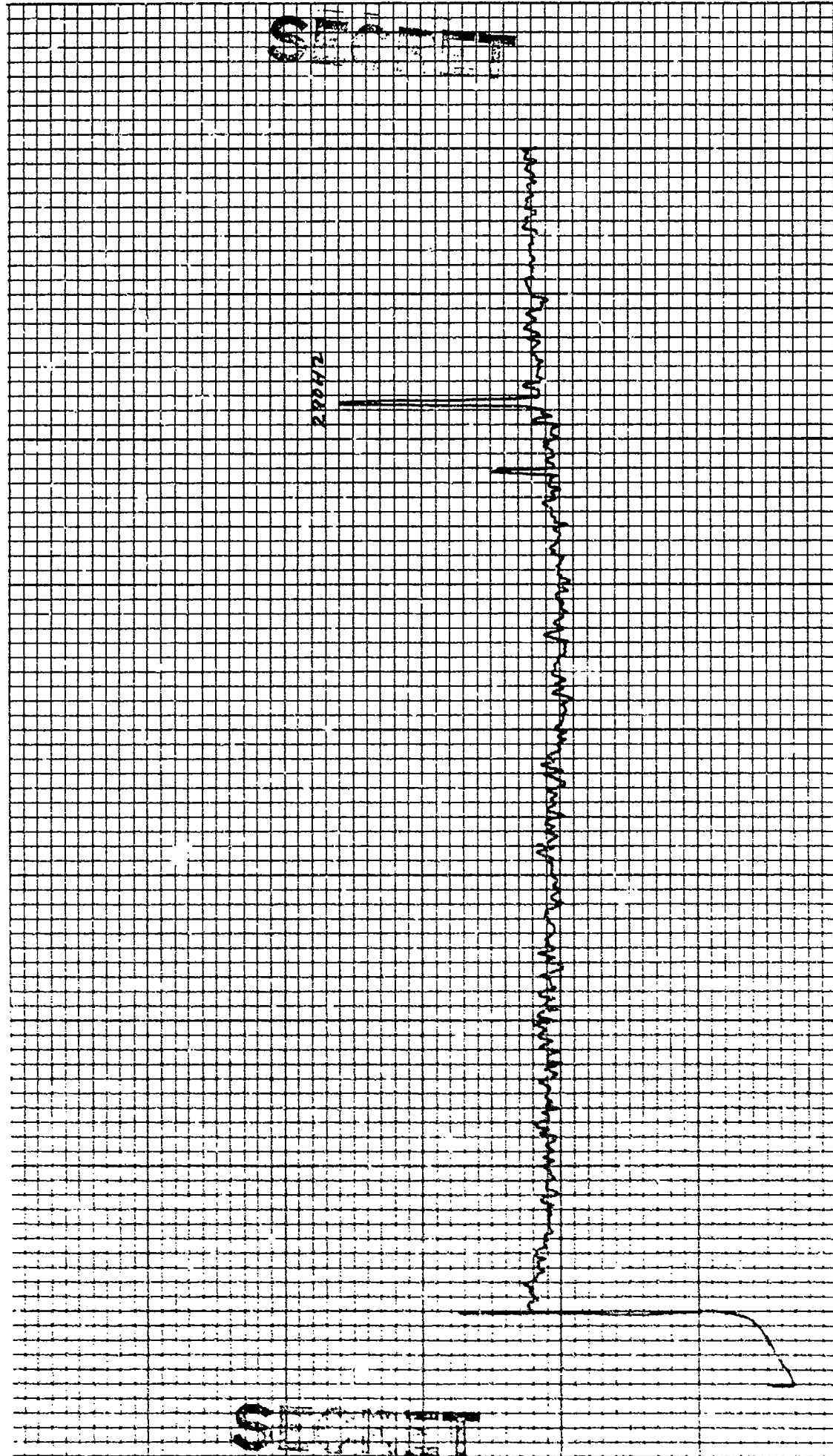
CONTROL: 0633 - 72 (DP10) DATE OF ANALYSIS: - - - -
 BEAMFORMED SPECTRUM (ELEMENTS 1-6 & 9-26 & 29-35)
 EXERCISE: BEARING STAKE DATE/TIME: 3-6-77 - 0633 Z
 CENTER FREQ: 270 HZ ANALYSIS BANDWIDTH: 1/10 HZ
 32 ELEMENTS + 50 DEG. AZ STEERING

REEL: K19 INDE X1637

INTEGRATION TIME 320 SECS ATTN: -18 DB
 FILTER WTG: HANNING



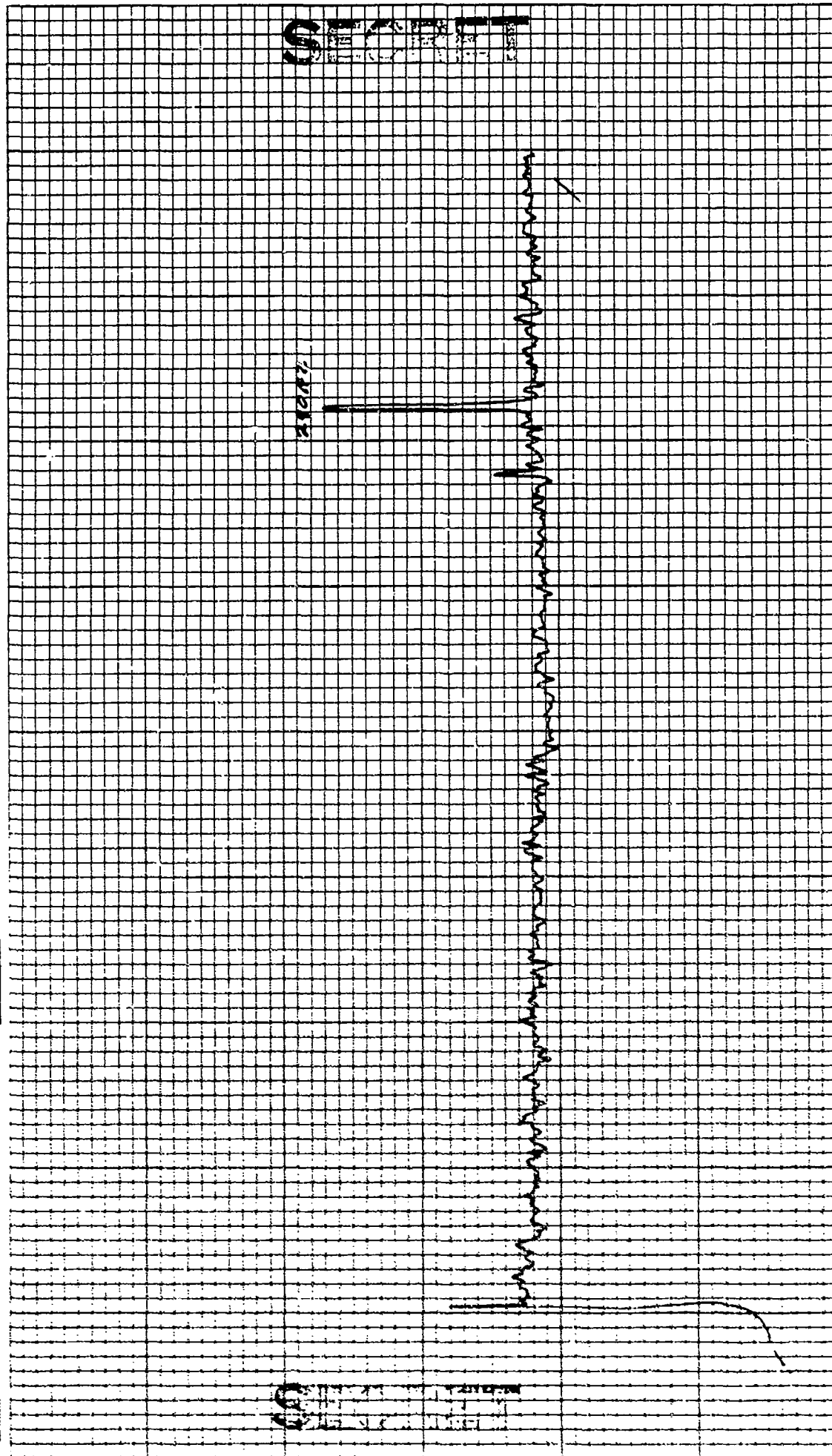
CONTROL: 0633-32 (2010) DATE OF ANALYSIS: 1-6-68 26 28-35) REEL: M18 INDE X 1637
 TRANSFORMED SPECTRUM (ELEMENTS) DATE/TIME: 3-16-77 - 0633Z INTEGRATION TIME 320 SECS ATTEN: 78 DB
 EXERCISE: BEARING STAKE ANALYSIS BANDWIDTH: 1/10 HZ FILTER WTG: HANNING
 CENTER FREQ: 270 HZ
32 ELEMENTS 40 DEG. AZ STEERING



K-E 10 X 10 TO THE INCH • 3 X 10 INCHES
KEUFFEL & ESSER CO. MADE IN U.S.A.

46 0703

CONTROL: 0633 - 32 (DP14) DATE OF ANALYSIS: - - - -
BEAMFORMED SPECTRUM (ELEMENTS) 1-68 2-26 4-08-35)
EXERCISE: BEARING STAKE INTEGRATION TIME 320 SECS REEL: M19 INDE X1637
CENTER FREQ: 270 HZ ANALYSIS BANDWIDTH: 1/10 HZ FILTER ATTN: -70 DB
32 ELEMENTS +61 DEG. AZ STEERING WIG: HANNING



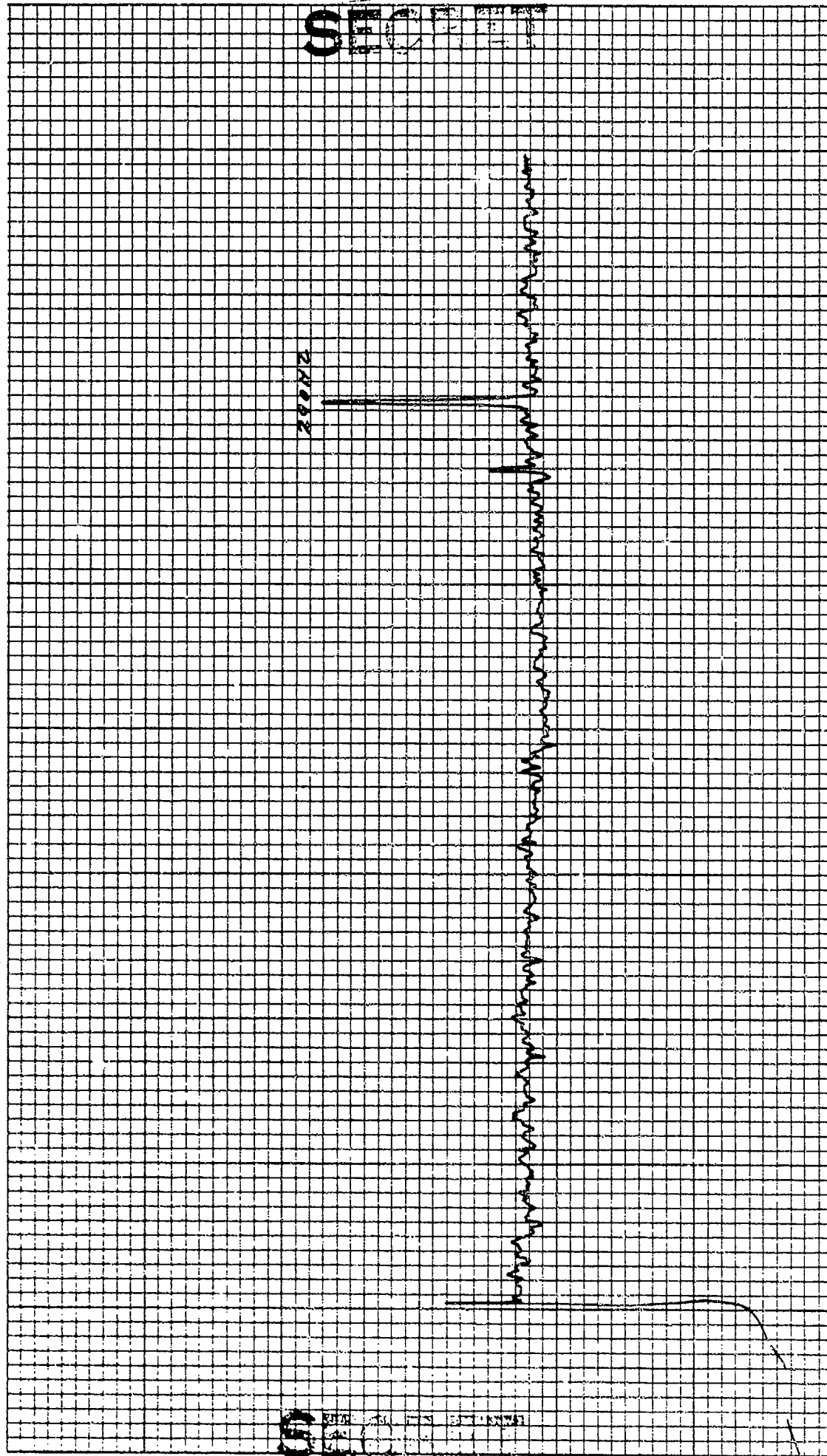
K-E 10 X 10 TO THE INCH • 7 X 10 INCHES
REUPVEL & ESSER CO. MADE IN U.S.A.

46 0703

CONTROL: 0077 - 32 (2010) DATE OF ANALYSIS: - - -
BEAMFORMED SPECTRUM(ELEMENTS 1-6 & 8-26 & 28-35)
EXERCISE: BEARING STAKE DATE/TIME: 3-16-77 - 0033 Z
CENTER FREQ: 270 HZ ANALYSIS BANDWIDTH: 1/10HZ
32 ELEMENTS +16.25 DEG. AZ STEERING

REEL: M19 INDE X1677

INTEGRATION TIME 320 SECS ATTN: -10 DB
FILTER WTG: HANNING



KOE 10 X 10 TO THE INCH • 7 X 10 INCHES
KEUFFEL & ESSER CO. MADE IN U.S.A.

46 0703

CONTROL: 0633 - 32 (0810) DATE OF ANALYSIS: 1-6-68 20-35 REEL: 1819 INDE X1637
BEAMFORMED SPECTRUM (ELEMENTS) 32 EXERCISE: BEARING STAKE
CENTER FREQ: 270 HZ ANALYSIS BANDWIDTH: 1/10 HZ INTEGRATION TIME 320 SECS ATTEN: 10 DB
32 ELEMENTS +66.5 DEG. AZ STEERING FILTER WTC: HANNING

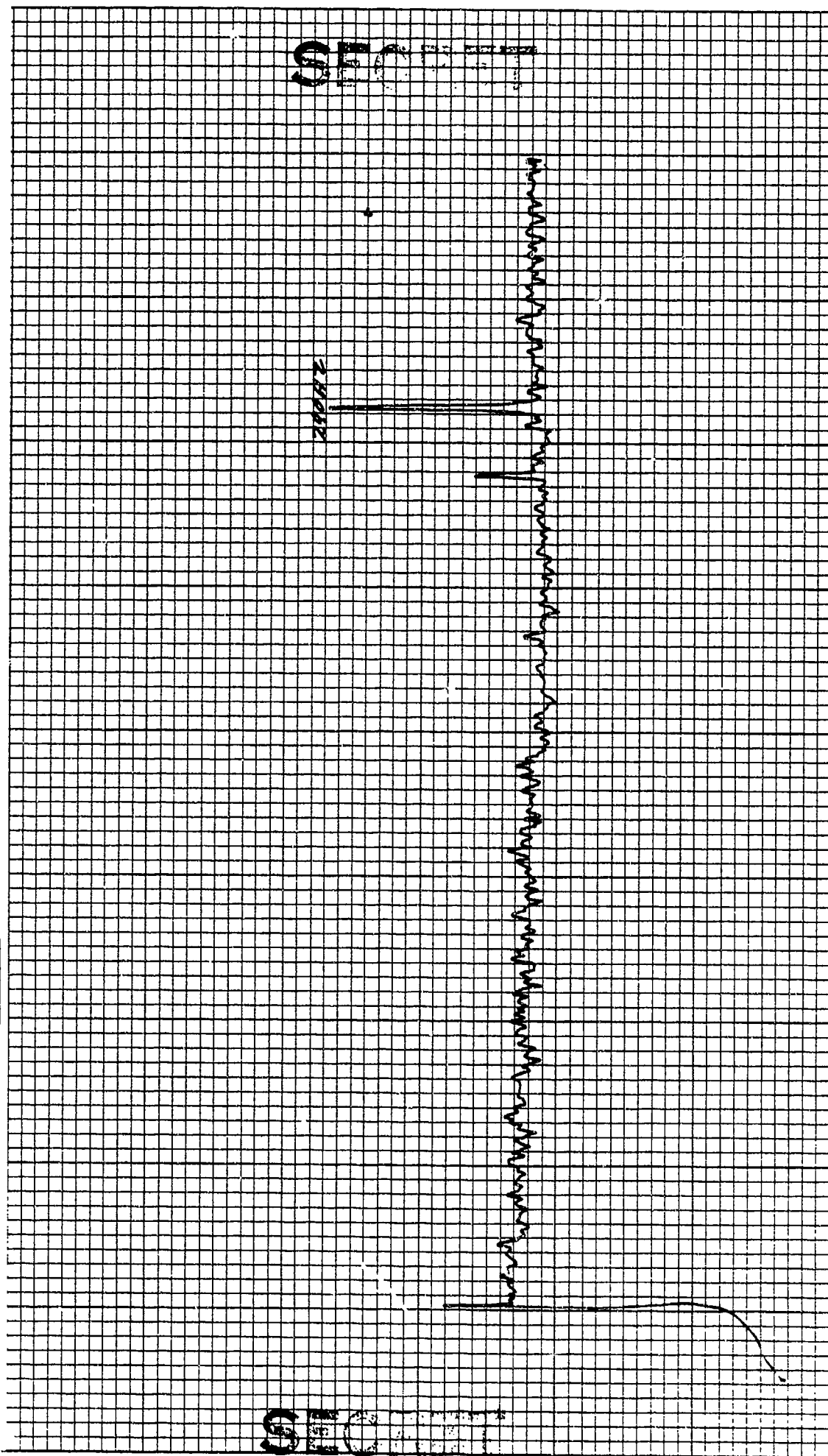
SECRET

200000

Handwritten notes and a large 'X' mark on the grid.

46 0703

CONTROL: 0633-32 (DP10)
BEAMFORMED SPECTRUM(ELEMENTS
EXERCISE: BEARING STAKE
CENTER FREQ: 270 HZ
32 ELEMENTS
DATE OF ANALYSIS: - - -
1-6 4 8-26 420-35)
DATE/TIME: 3-16-77 - 0633 Z
ANALYSIS BANDWIDTH: 1/10 HZ
+ 62.5 DEG. AZ STEERING
INTEGRATION TIME 320 SECS
FILTER
REEL: M19
INDEX: X1637
ATTN: -8 DB
WTG: HANNING



K-E 10 X 10 TO THE INCH • 7 X 10 INCHES
KEUFFEL & ESSER CO. MADE IN U.S.A.

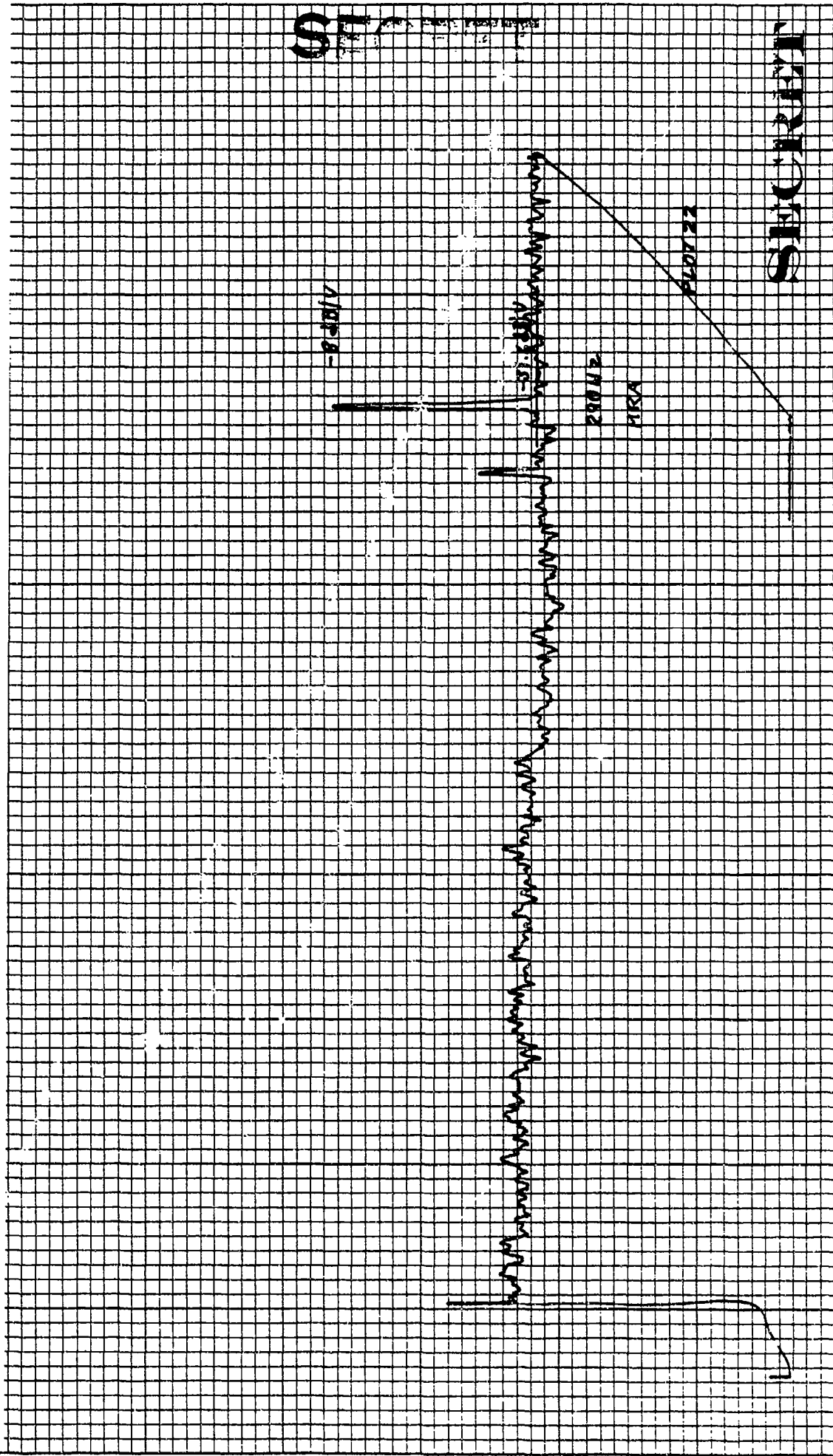
46 0703

SECRET

CONTROL: 0633 - 49 (DP10) DATE OF ANALYSIS: 1706 97026 297035
BEAMFORMED SPECTRUM(ELEMENTS) ANALYSIS BANDWIDTH: 1/10HZ
EXERCISE: BEARING STAKE ANALYSIS BANDWIDTH: 1/10HZ
CENTER FREQ: 270 HZ 163.0 DEG. AZ STEERING

REEL: 419 INDE X 1677

INTEGRATION TIME 320 SECS ATTN: - DB
FILTER WTG: HANNING



272 Hz

270 Hz

308 Hz

K-E 10 X 10 TO THE INCH • 7 X 10 INCHES
KEUFFEL & ESSER CO. MADE IN U.S.A.

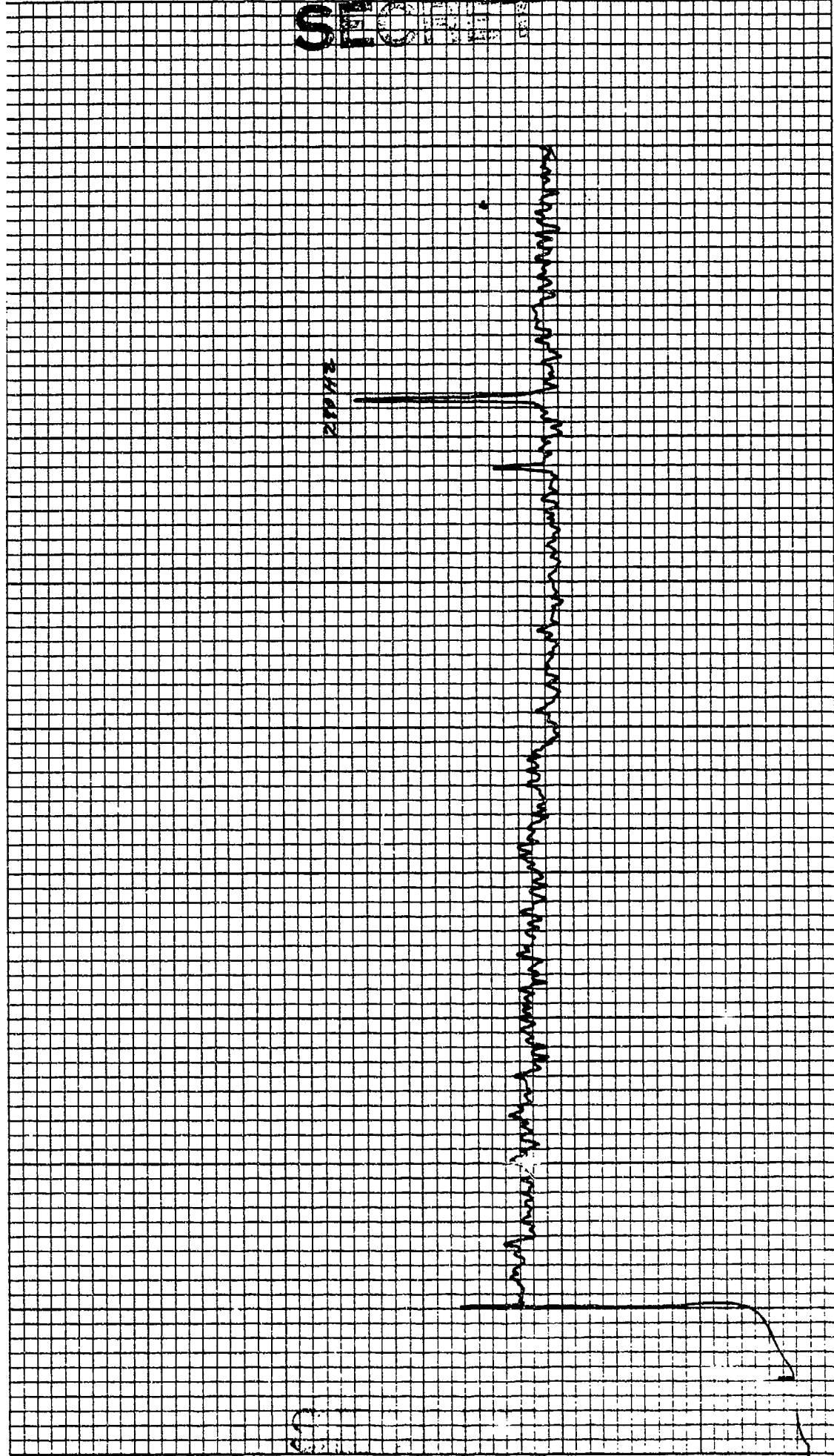
46 0703

CONTROL: 0633 - 32 (D910)
BEAMFORMED SPECTRUM (ELEMENTS)
EXERCISE: BEARING STAKE
CENTER FREQ: 270 HZ
32 ELEMENTS

DATE OF ANALYSIS: 1-6 49-26 4 29-35)
DATE/TIME: 3-6-77 - 0633 Z
ANALYSIS BANDWIDTH: 1/10 HZ
+ 64 DEG. AZ STEERING

REEL: M19
INDE X/637

INTEGRATION TIME 320 SECS
ATTEN: -10 DB
FILTER
WTG: HANNING



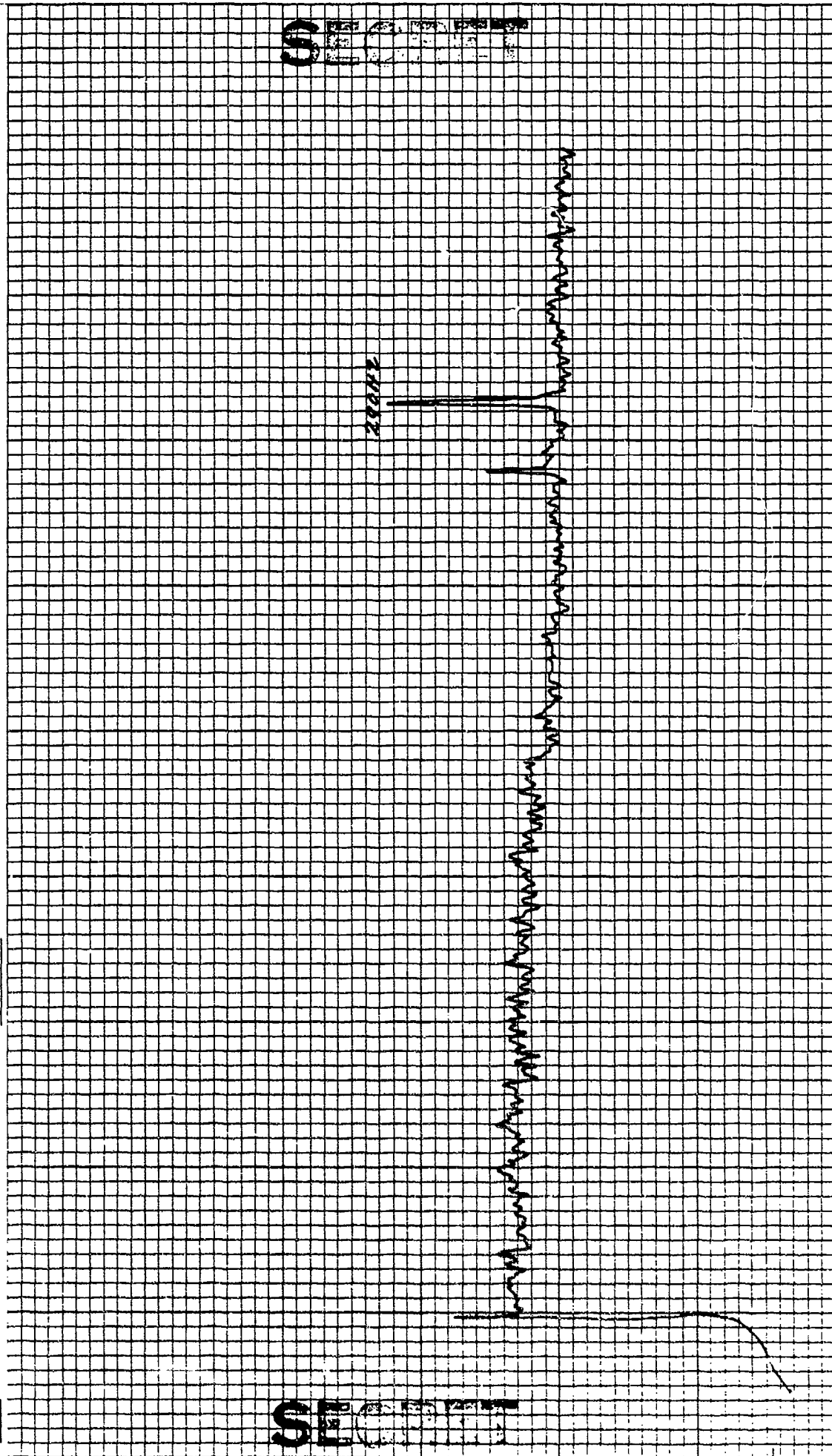
KOE 16 X 10 TO THE INCH • 7 X 10 INCHES
KEUFFEL & ESSER CO. MADE IN U.S.A.

46 0703

CONTROL: 0693 - 32 (DP10) DATE OF ANALYSIS: - - - -
BEAMFORMED SPECTRUM (ELEMENTS 1-648-26488-35)
EXERCISE: BEARING STAKE DATE/TIME: 376-77 - 0633 Z
CENTER FREQ: 270 HZ ANALYSIS BANDWIDTH: 1/10 HZ
32 ELEMENTS +66 DEG. AZ STEERING

REEL: 418 INDE X1637

INTEGRATION TIME 320 SECS ATTN: -10 DB
FILTER WTG: HANNING



KOE 10 X 10 TO THE INCH • 7 X 10 INCHES
KEUFFEL & ESSER CO. MADE IN U.S.A.

46 0703

CONTROL: 0633-32 (0910) DATE OF ANALYSIS: - - - -
BEAMFORMED SPECTRUM(ELEMENTS 1-6 8-26 28-35)
EXERCISE: BEARING STAKE DATE/TIME: 3-16-77-0233 Z
CENTER FREQ: 270 HZ ANALYSIS BANDWIDTH: 1/10HZ
32 ELEMENTS 168 DEG. AZ STEERING

REEL: M19

INDE X 1637

INTEGRATION TIME 320 SECS
ATTEN: -18 DB
FILTER WTG: HANNING

SECRET

290HZ

Handwritten notes and markings on the grid, including a large 'X' and various scribbles.

KOE 10 X 10 TO THE INCH • 7 X 10 INCHES
KEUFFEL & ESSER CO. MADE IN U.S.A.

46 0703

CONTROL: 0633 - 32 (DP10)
BEAMFORMED SPECTRUM (ELEMENTS)
EXERCISE: BEARING STAKE
CENTER FREQ: 270 HZ
32 ELEMENTS
DATE OF ANALYSIS: 1-08-77-08-35
DATE/TIME: 3-16-77-0833 Z
ANALYSIS BANDWIDTH: 1/10HZ
+ 72 DEG. AZ STEERING

REEL: M19 INDE X1677

INTEGRATION TIME 320 SECS
ATTEN: -10 DB
FILTER WTG: HANNING

SECRET

220HZ

Handwritten notes and a large bracket on the right side of the grid.

46 0703

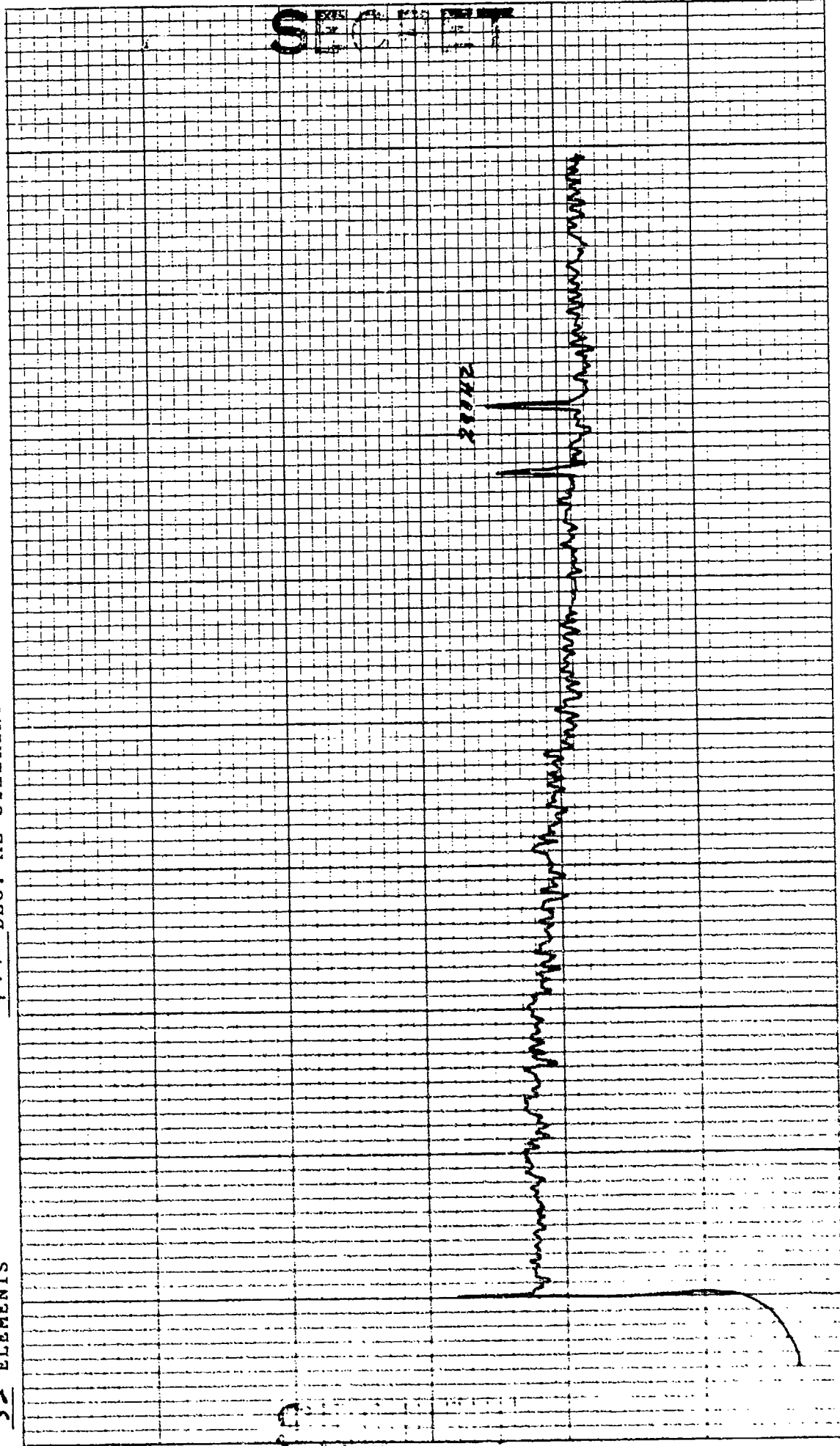
CONTROL: 0633 - 32 (2010)
BEAMFORMED SPECTRUM (ELEMENTS 1-6 29-26 8 29-75)
EXERCISE: BEARING STAKE
CENTER FREQ: 270 HZ
32 ELEMENTS

DATE OF ANALYSIS: - - - -
DATE/TIME: 3-16-77 - 0633Z
ANALYSIS BANDWIDTH: 1/10HZ
+ 74 DEG. AZ STEERING

REEL: 419

INDE X 437

INTEGRATION TIME 320 SECS
ATTEN: -10 DB
WTC: HANNING
FILTER



~~CONFIDENTIAL~~
SIGNAL LEVEL AND SNR
CALCULATIONS

DATA POINT 10

FREQUENCY 140 HZ

NUMBER OF ELEMENTS 49

SIGNAL LEVEL

MCPS-32 SIGNAL LEVEL INDICATED	<u>-21.6</u>	
MCPS-32 CAL. CORRECTION	<u>+10</u>	-11.6
BEAMFORMER GAIN	<u>+24</u>	+12.4 SIG. LEVEL FOR SNR CALCULATION
MRA CORRECTION	<u>+ .2</u>	+12.6 SIG. LEVEL FOR SIGNAL GAIN

NOISE LEVEL

MCPS-32 SIGNAL LEVEL INDICATED	<u>-54.4</u>	
MCPS-32 CAL. CORRECTION	<u>+10</u>	-44.4
BEAMFORMER GAIN	<u>+24</u>	-20.4 NOISE LEVEL FOR SNR CALCULATION

SIGNAL-NOISE-RATIO

SIGNAL LEVEL FOR SNR	<u>+12.6</u>	
SIGNAL LEVEL FOR SNR	<u>-20.4</u>	33.0
PROCESSOR CORRECTION	<u>- 4.0</u>	29.0
MRA CORRECTION	<u>+ .2</u>	29.2 SNR 1/10 HZ BAND
BANDWIDTH CONVERSION	<u>- 8.2</u>	21.0 SNR 1 HZ BAND

~~CONFIDENTIAL~~
SIGNAL LEVEL AND SNR

CALCULATIONS

DATA POINT 10

FREQUENCY 290 HZ

NUMBER OF ELEMENTS 49

SIGNAL LEVEL

MCPS-32 SIGNAL LEVEL INDICATED	<u>-39.0</u>	
MCPS-32 CAL. CORRECTION	<u>+10</u>	-29.0
BEAMFORMER GAIN	<u>+24</u>	-5.0 SIG. LEVEL FOR SNR CALCULATION
MRA CORRECTION	<u>+ .9</u>	-4.1 SIG. LEVEL FOR SIGNAL GAIN

NOISE LEVEL

MCPS-32 SIGNAL LEVEL INDICATED	<u>-64.1</u>	
MCPS-32 CAL. CORRECTION	<u>+10</u>	-54.1
BEAMFORMER GAIN	<u>+24</u>	-30.1 NOISE LEVEL FOR SNR CALCULATION

SIGNAL-NOISE-RATIO

SIGNAL LEVEL FOR SNR	<u>-5.0</u>	
SIGNAL LEVEL FOR SNR	<u>-30.1</u>	25.1
PROCESSOR CORRECTION	<u>-4.0</u>	21.1
MRA CORRECTION	<u>+ .9</u>	22.0 SNR 1/10 HZ BAND
BANDWIDTH CONVERSION	<u>-8.2</u>	13.8 SNR 1 HZ BAND

CONFIDENTIAL

DATA POINT 10

SIGNAL GAIN

	<u>140 HZ</u>	<u>290HZ</u>	<u>295HZ</u>
MEAN OMNI SIGNAL LEVEL	<u>-23.3</u>	<u>-38.0</u>	<u> </u>
MRA SIGNAL LEVEL	<u>+12.6</u>	<u>-4.1</u>	<u> </u>
ARRAY SIGNAL GAIN	<u>35.9</u>	<u>33.9</u>	<u> </u>
20 LOG <u>49</u>	<u>33.8</u>	<u>33.8</u>	<u> </u>
# of elements			
DIFFERENCE	<u>+2.1</u>	<u>+ .1</u>	<u> </u>

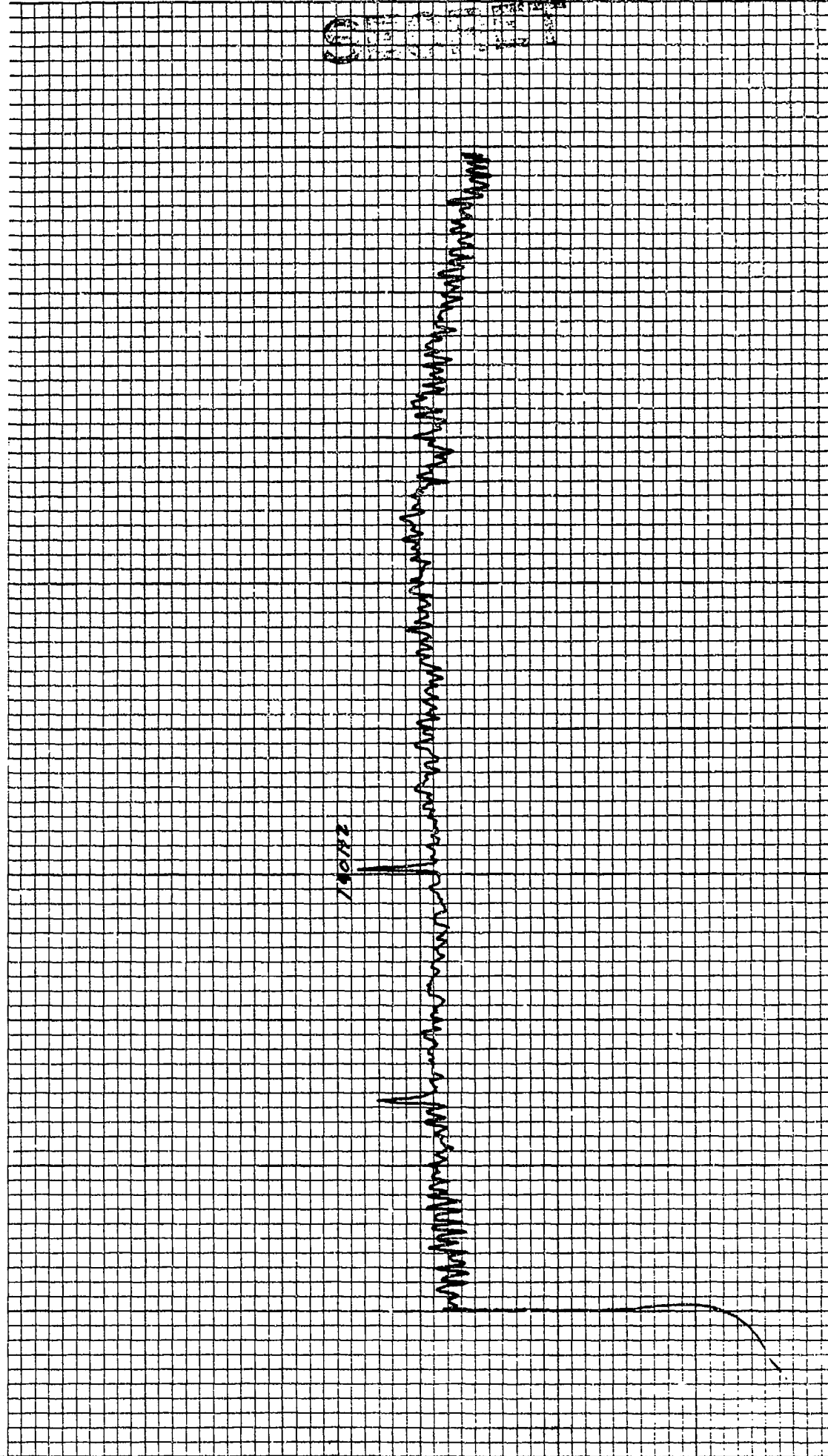
ARRAY GAIN

MRA SNR	<u>29.2</u>	<u>22.0</u>	<u> </u>
MEAN OMNI SNR	<u>18.7</u>	<u>8.4</u>	<u> </u>
ARRAY GAIN	<u>10.5</u>	<u>12.6</u>	<u> </u>
THEORETICAL AZMUTH GAIN (at MRA)	<u>12.4</u>	<u>15.0</u>	<u> </u>
DIFFERENCE	<u>-1.9</u>	<u>-2.4</u>	<u> </u>

KΣ 10 X 10 TO THE INCH • 7 X 10 INCHES
HEUFFEL & ESSER CO. MADE IN U.S.A.

46 0703

CONTROL: 0633 - 49 (DP10) DATE OF ANALYSIS: - - - - - REEL: 419 INDE X1637
BEAMFORMED SPECTRUM (ELEMENTS) 1-6 6 8-26 4 08-53)
EXERCISE: BEARING STAKE DATE/TIME: 3-16-77 - 0633 Z INTEGRATION TIME 320 SECS ATTN: -24 DB
CENTER FREQ: 150 HZ ANALYSIS BANDWIDTH: 1/10 HZ FILTER WTG: HANNING
49 ELEMENTS +54 DEG. AZ STEERING



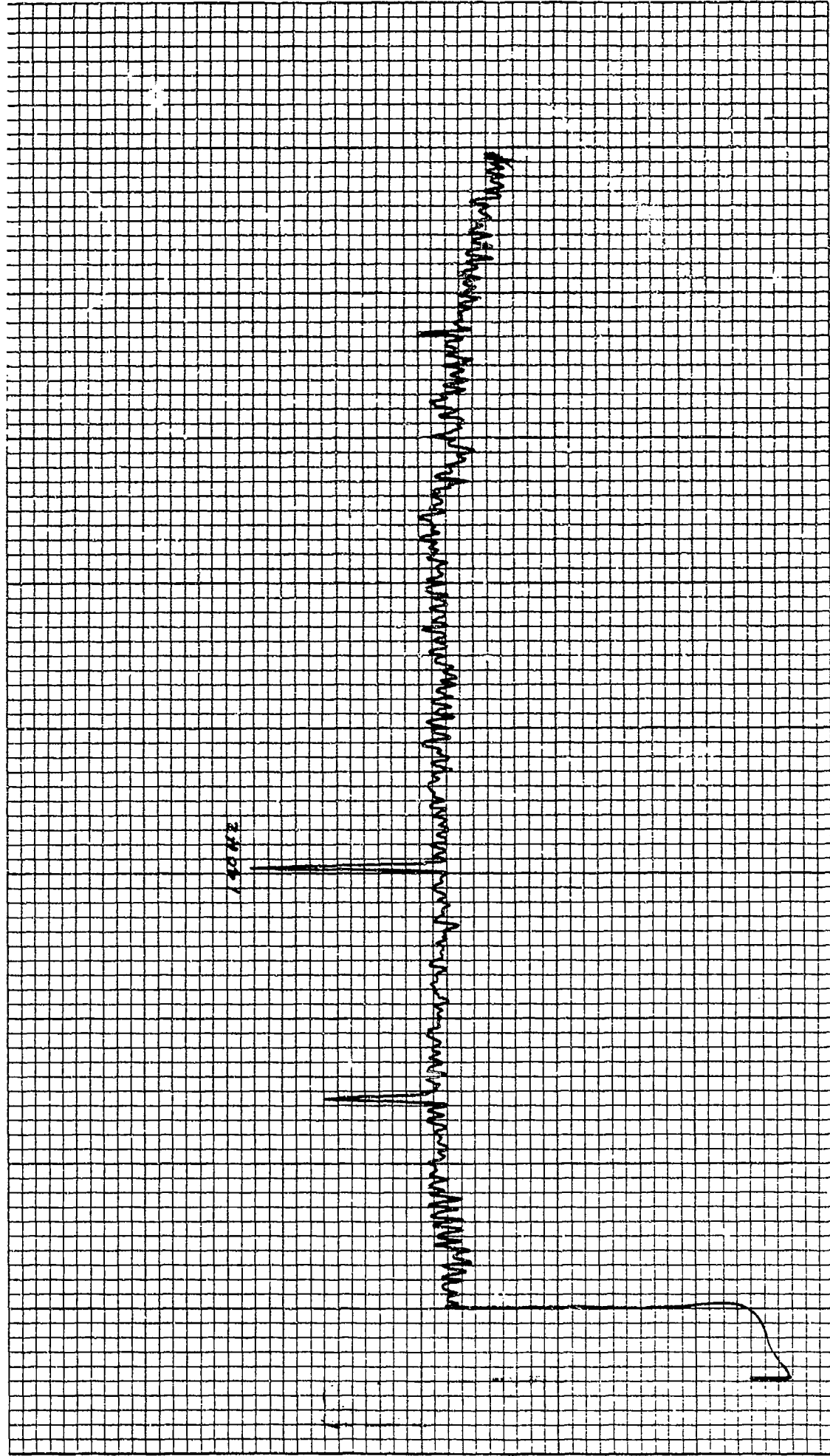
KOE 10 X 10 TO THE INCH • 7 X 10 INCHES
KEUFFEL & ESSER CO. MADE IN U.S.A.

45 0703

CONTROL: 0633 - 49 (DP10)
BEAMFORMED SPECTRUM (ELEMENTS
EXERCISE: BEARING STAKE
CENTER FREQ: 150 HZ
19 ELEMENTS

DATE OF ANALYSIS: 1-6-79-26-88-53
DATE/TIME: 3-6-77 - 0633Z
ANALYSIS BANDWIDTH: 1/10HZ
156 DEG. AZ STEERING

REEL: M19 INDE X 1637
INTEGRATION TIME 320 SECS
ATTEN: -24 DB
FILTER WTG: HANNING



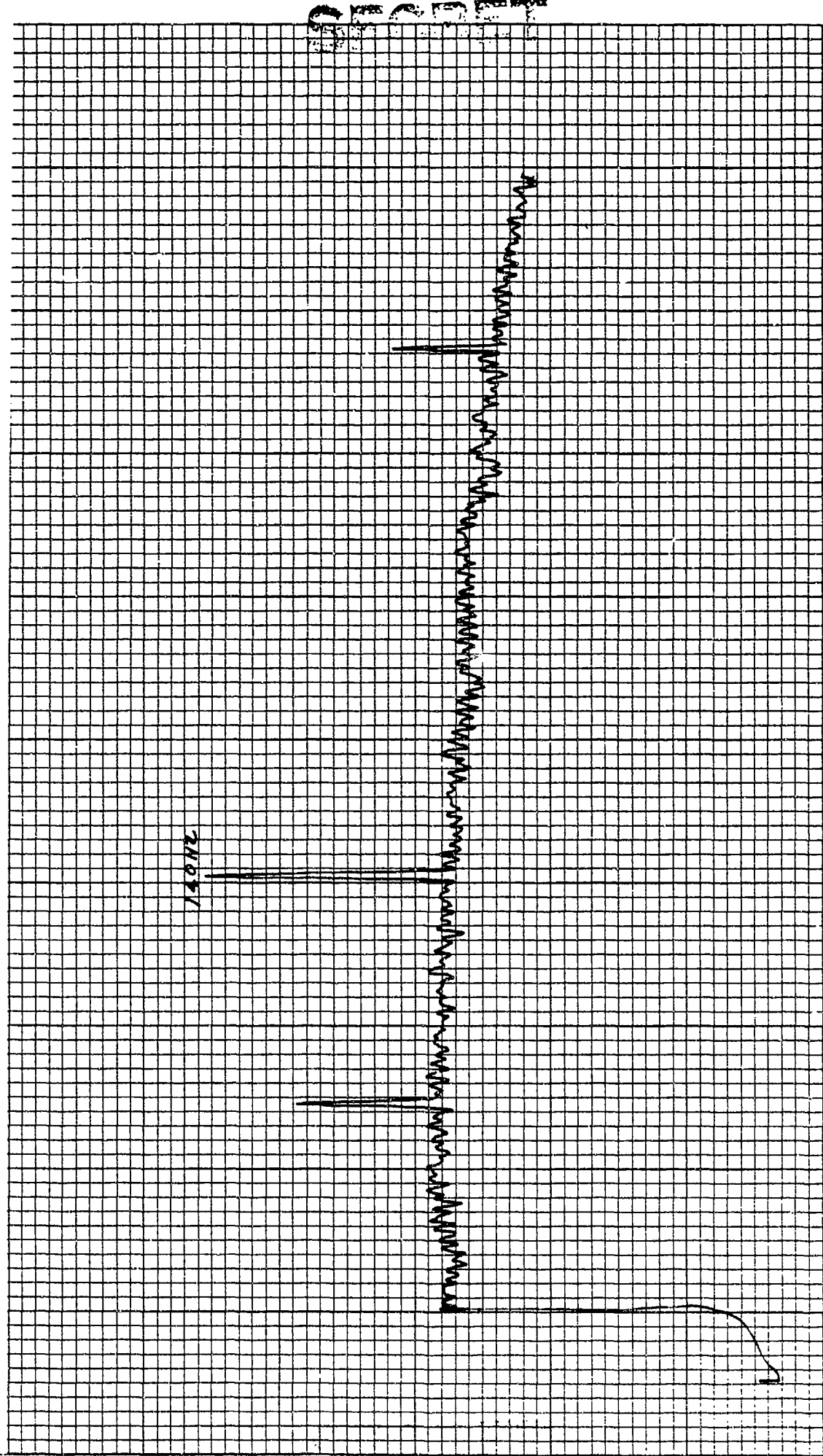
KOE 10 X 10 TO THE INCH • 7 X 10 INCHES
KEUFFEL & ESSER CO. MADE IN U.S.A.

46 0703

CONTROL: 0633 - 49 (D910)
BEAMFORMED SPECTRUM (ELEMENTS)
EXERCISE: BEARING STAKE
CENTER FREQ: 150 HZ
49 ELEMENTS

DATE OF ANALYSIS: 1-68-26 08-53
DATE/TIME: 3-16-77 - 0633 Z
ANALYSIS BANDWIDTH: 1/10 HZ
+50 DEG. AZ STEERING

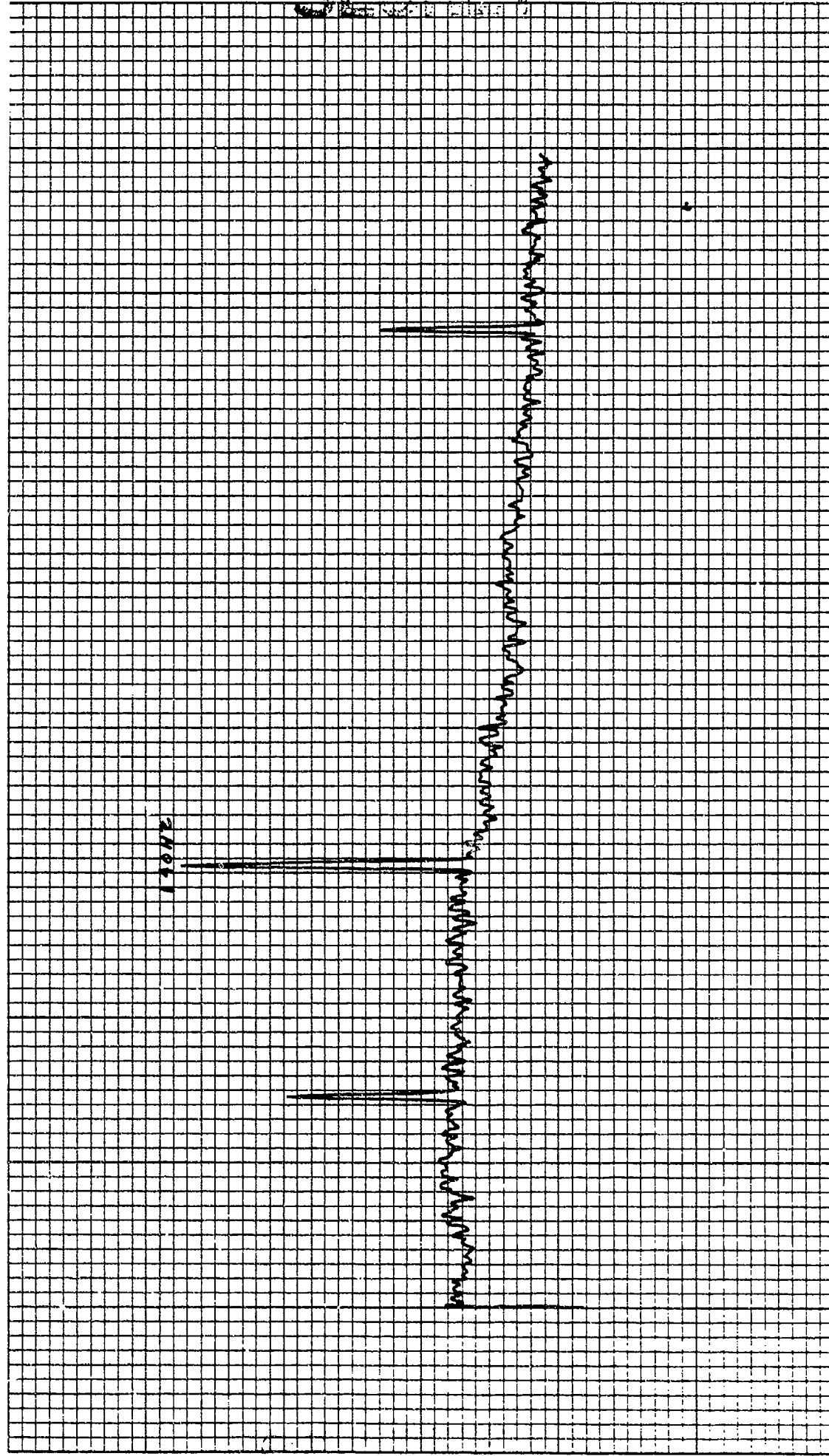
REEL: M18 INDE X1637
INTEGRATION TIME 320 SECS
ATTEN: -24 DB
FILTER
WTG: HANNING



K.E 10 X 10 TO THE INCH • 7 X 10 INCHES
NEUFTEL & ESSER CO. MADE IN U.S.A.

46 0703

CONTROL: 0633 - 49 (Dpio) DATE OF ANALYSIS: 1-6-77 REEL: M/9 INDE X/137
BEAMFORMED SPECTRUM(ELEMENTS) 1-6-77-26420-53
EXERCISE: BEARING STAKE DATE/TIME: 3-16-77 - 0633 Z INTEGRATION TIME 320 SECS ATTN: -24 DB
CENTER FREQ: 150 HZ ANALYSIS BANDWIDTH: 1/10HZ FILTER WTG: HANNING
49 ELEMENTS 460 DEG. AZ STEERING



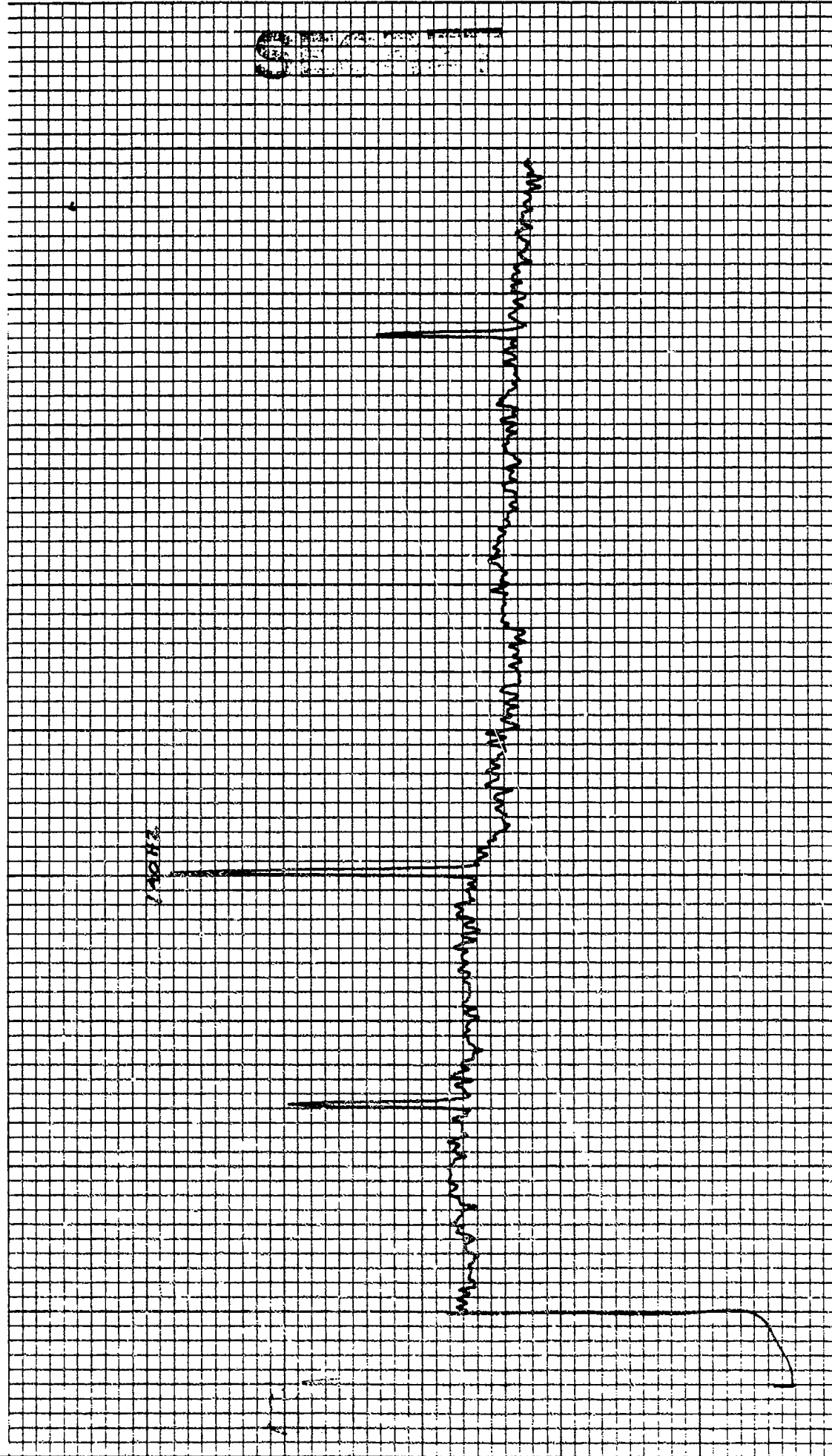
K-E 10 X 10 TO THE INCH • 7 X 10 INCHES
KEUPPEL & ESSER CO. MADE IN U.S.A.

46 0703

CONTROL: 0633 - 49 (DP10)
BEAMFORMED SPECTRUM (ELEMENTS
EXERCISE: BEARING STAKE
CENTER FREQ: 152 HZ
49 ELEMENTS

DATE OF ANALYSIS: - - - -
1-6 49-26 498-35)
DATE/TIME: 3-16-77 -0633 Z
ANALYSIS BANDWIDTH: 1/10 HZ
+66.5 DEG. AZ STEERING

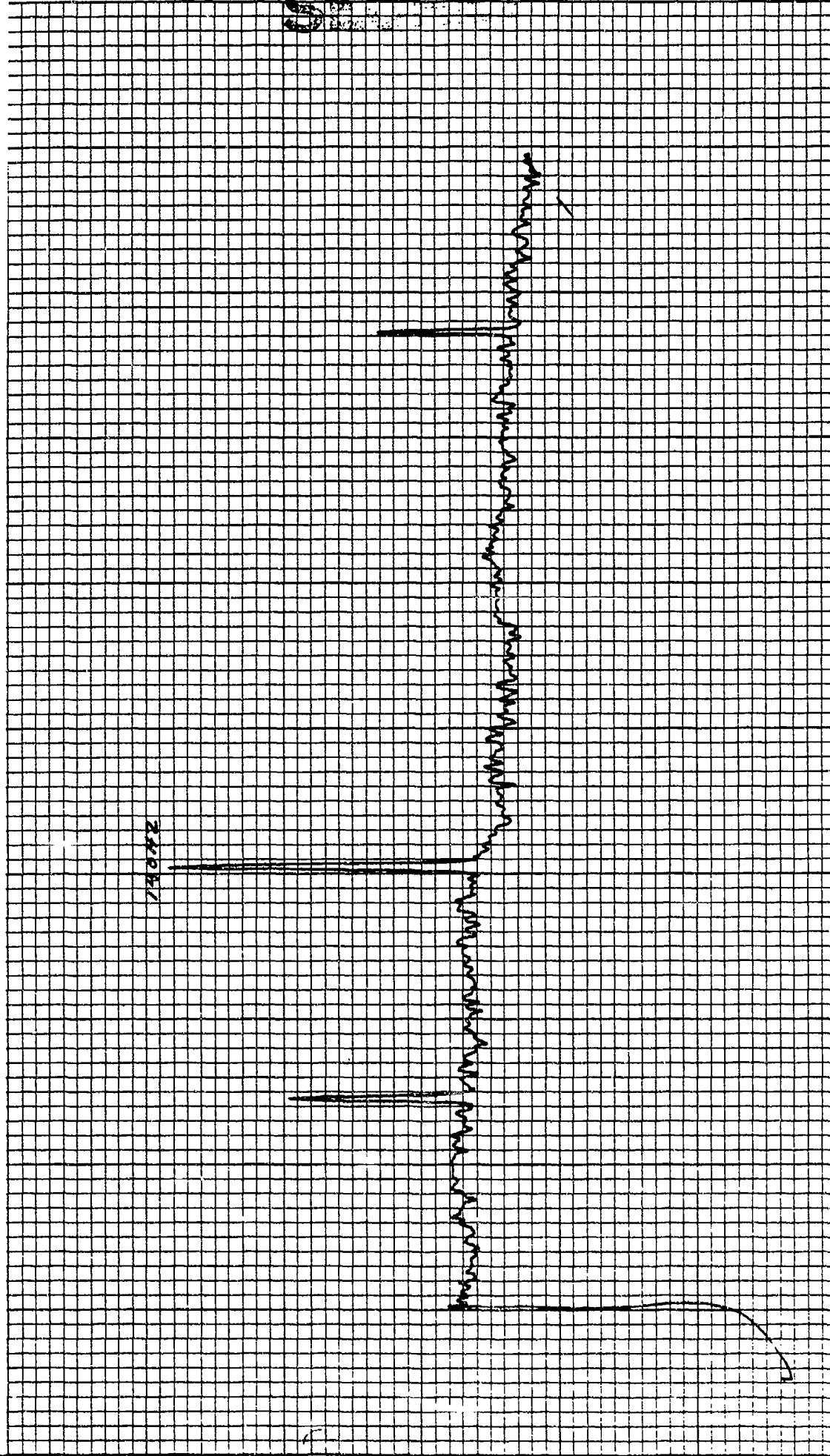
REEL: M19 INDE X1637
INTEGRATION TIME 320 SECS
ATTEN: -94 DB
FILTER WTG: HANNING



KOE 10 X 10 TO THE INCH • 7 X 10 INCHES
KEUFFEL & ESSER CO. MADE IN U.S.A.

46 0703

CONTROL: 0633 - 49 (DP16) DATE OF ANALYSIS: 1-6-8-26 438-53)
BEAMFORMED SPECTRUM (ELEMENTS) REEL: M19 INDE X1637
EXERCISE: BEARING STAKE INTEGRATION TIME 320 SECS ATTN: -24 DB
CENTER FREQ: 150 HZ FILTER WTG: HANNING
49 ELEMENTS ANALYSIS BANDWIDTH: 1/10 HZ
+ 62 DEG. AZ STEERING



K-E 10 X 10 TO THE INCH • 7 X 10 INCHES
KEUFFEL & ESSER CO. MADE IN U.S.A.

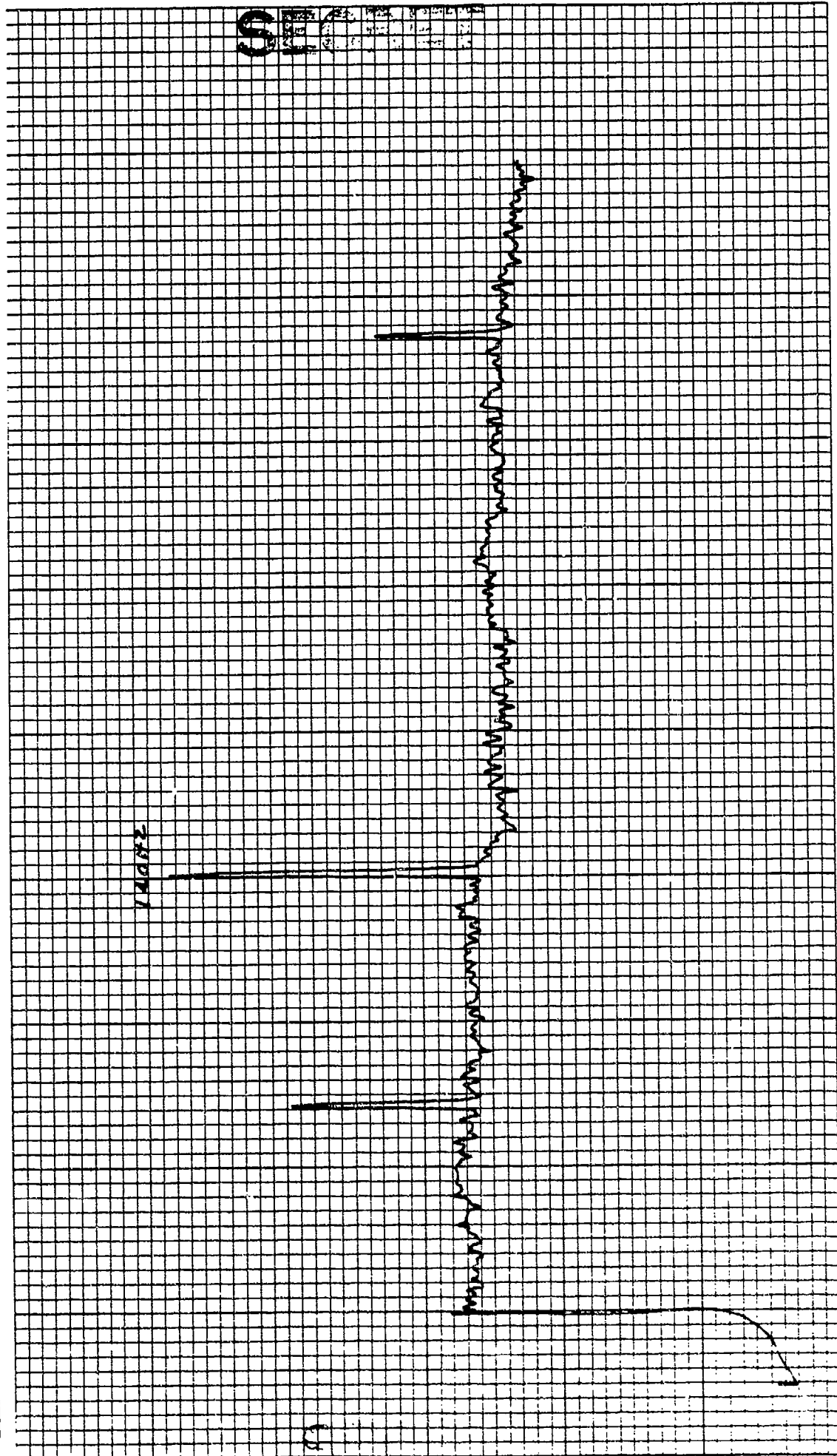
46 0703

CONTROL: 0637-49 (DB10)
BEAMFORMED SPECTRUM (ELEMENTS)
EXERCISE: BEARING STAKE
CENTER FREQ: 350 HZ
49 ELEMENTS

DATE OF ANALYSIS: 1-6-69-26408-35
DATE/TIME: 3-16-77-0633Z
ANALYSIS BANDWIDTH: 1/10 HZ
462.25 DEG. AZ STEERING

REEL: M19 INDE X1637

INTEGRATION TIME 320 SECS
ATTEN: 24 DB
FILTER
WTG: HANNING



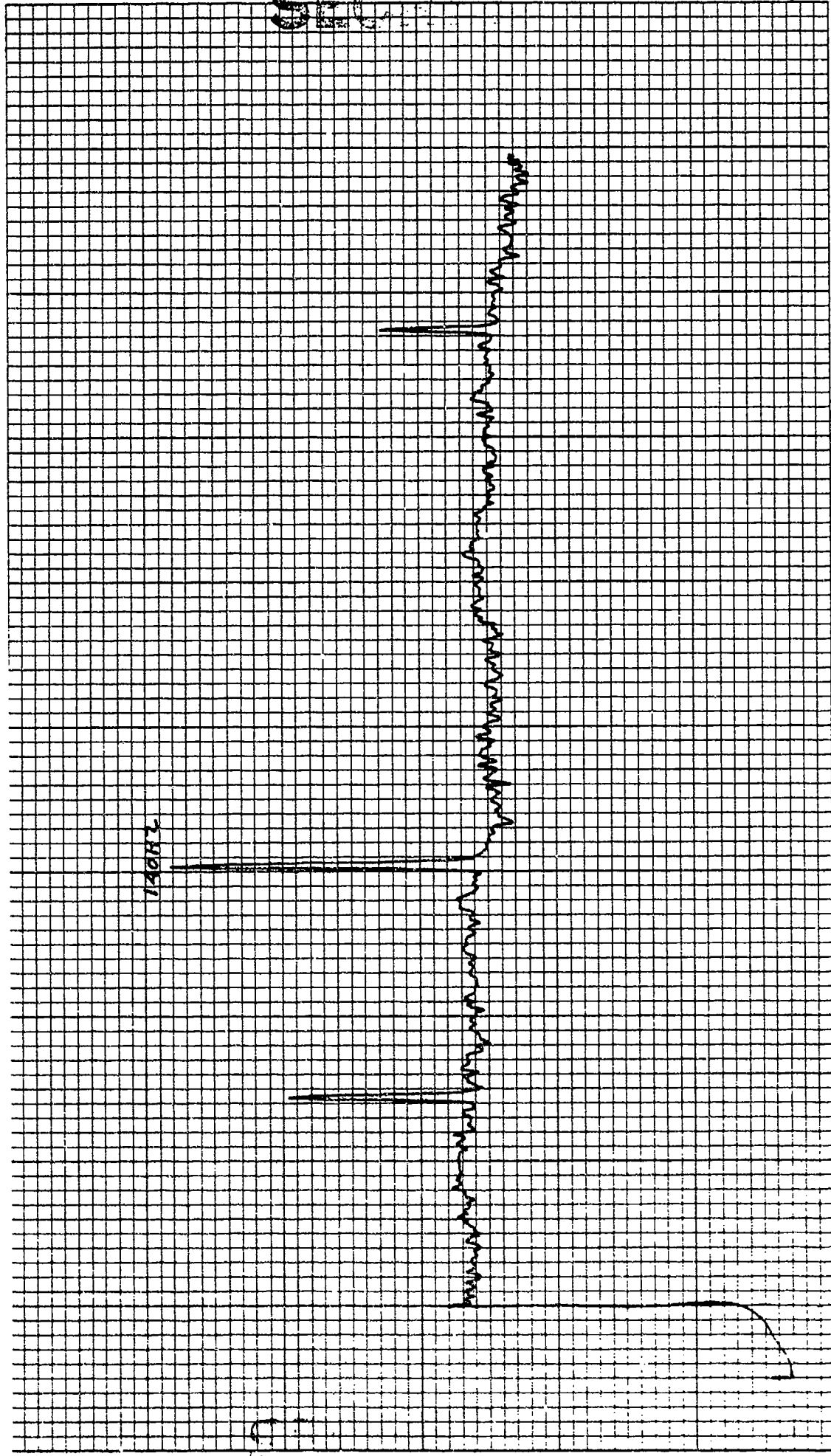
K.E 10 X 10 TO THE INCH • 7 X 10 INCHES
KEUFFEL & ESSER CO. MADE IN U.S.A.

46 0703

CONTROL: 0633 - 49 (DP10)
BEAMFORMED SPECTRUM (ELEMENTS 1-6 49-26 49-35)
EXERCISE: BEARING STAKE
CENTER FREQ: 150 HZ
49 ELEMENTS

DATE OF ANALYSIS: - - - - -
DATE/TIME: 3-16-77 - 0633 Z
ANALYSIS BANDWIDTH: 1/10 HZ
+ 63 DEG AZ STEERING

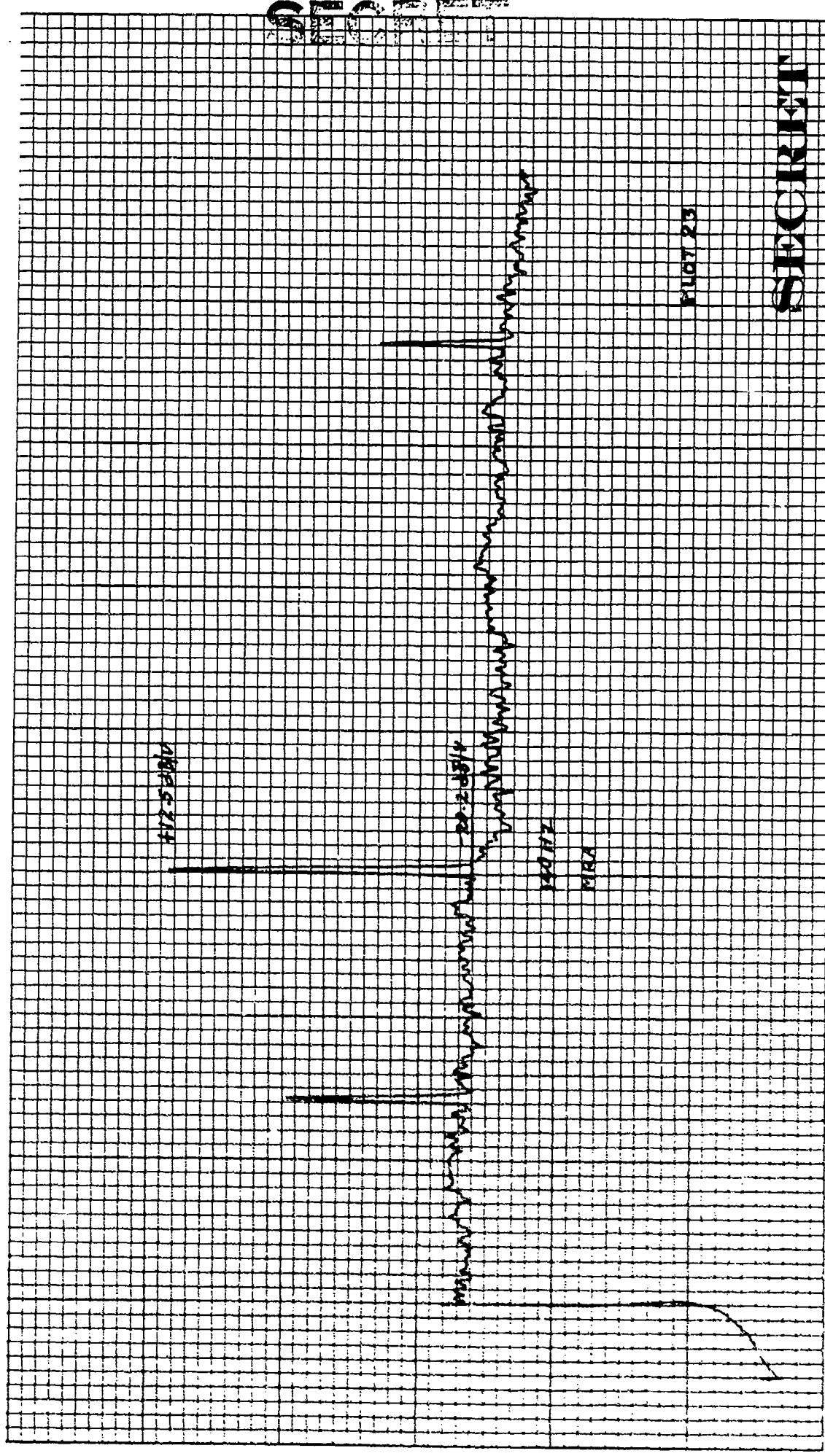
REEL: 819
INDE X 1637
INTEGRATION TIME 320 SECS
ATTEN: -2Y DB
WTG: HANNING
FILTER



46 0703

NOTES

CONTROL: 0633-49 (P110) REEL: M19 INDEX: X1637
BEAMFORMED SPECTRUM(ELEMENTS 106 97026 297053)
EXERCISE: BEARING STAKE
CENTER FREQ: 150 HZ
INTEGRATION TIME 320 SECS
ANALYSIS BANDWIDTH: 1/10 HZ
ATTN: - DB
WTG: HANNING
DATE OF ANALYSIS: 106 97026 297053
DATE/TIME: 3-16-77 - 0633 Z
ANALYSIS BANDWIDTH: 1/10 HZ
+62.5 DEG. AZ STEERING
49 ELEMENTS



THE

24117

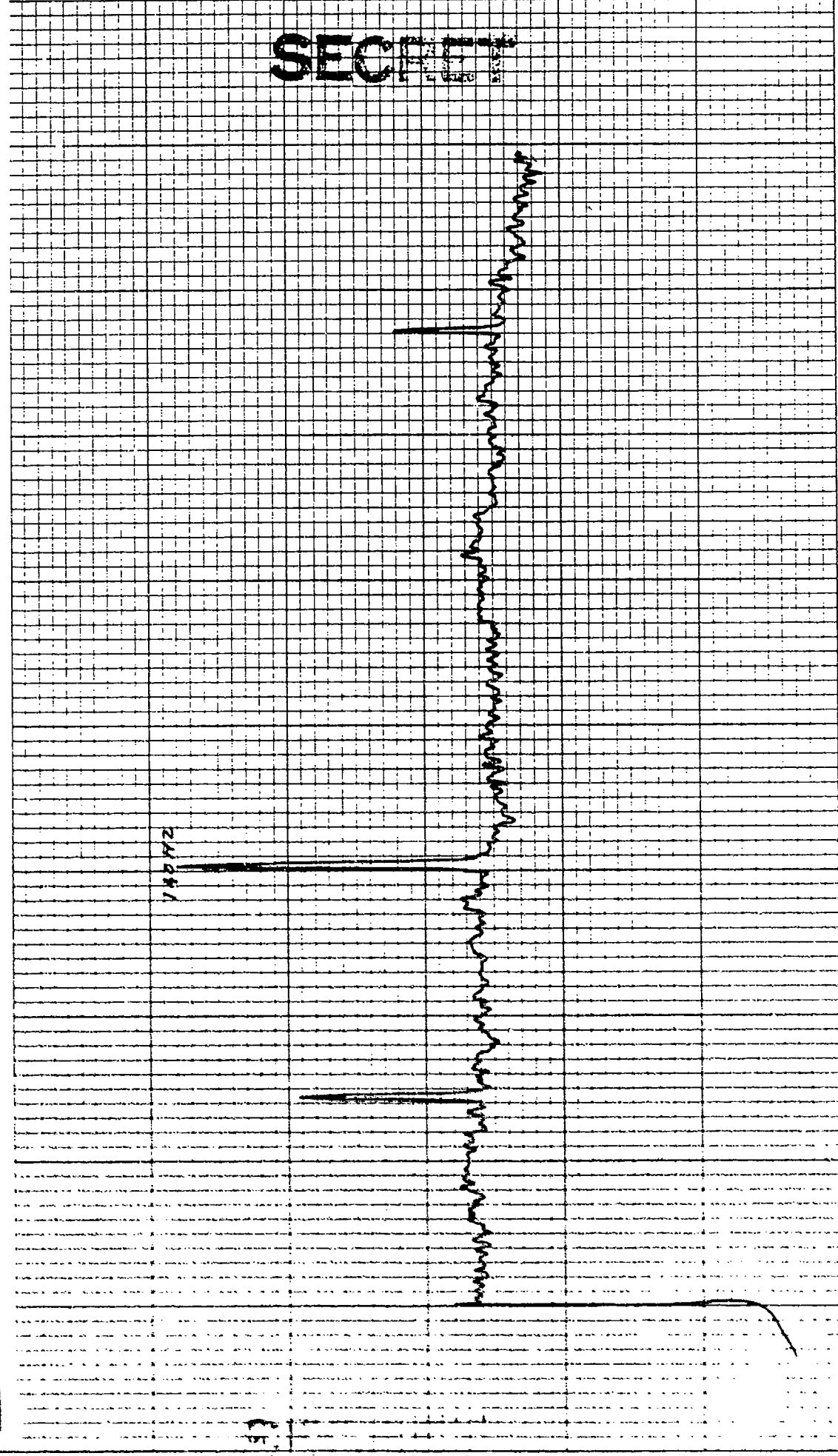
15042

2488

10 X 10 TO THE INCHES
KEUFFEL & ESSER CO. MADE IN U.S.A.

46 0703

CONTROL: 0123 - 49 (0010) DATE OF ANALYSIS: 1-68-06-08-53 INDE X 1637
BEAMFORMED SPECTRUM (ELEMENTS) DATE/TIME: 3-16-77 - 0633 Z REEL: M19
EXERCISE: BEARING STAKE ANALYSIS BANDWIDTH: 1/10HZ INTEGRATION TIME 320 SECS ATTN: -2YDB
CENTER FREQ: 150 HZ +24 DEG. AZ STEERING FILTER WTG: HANNING

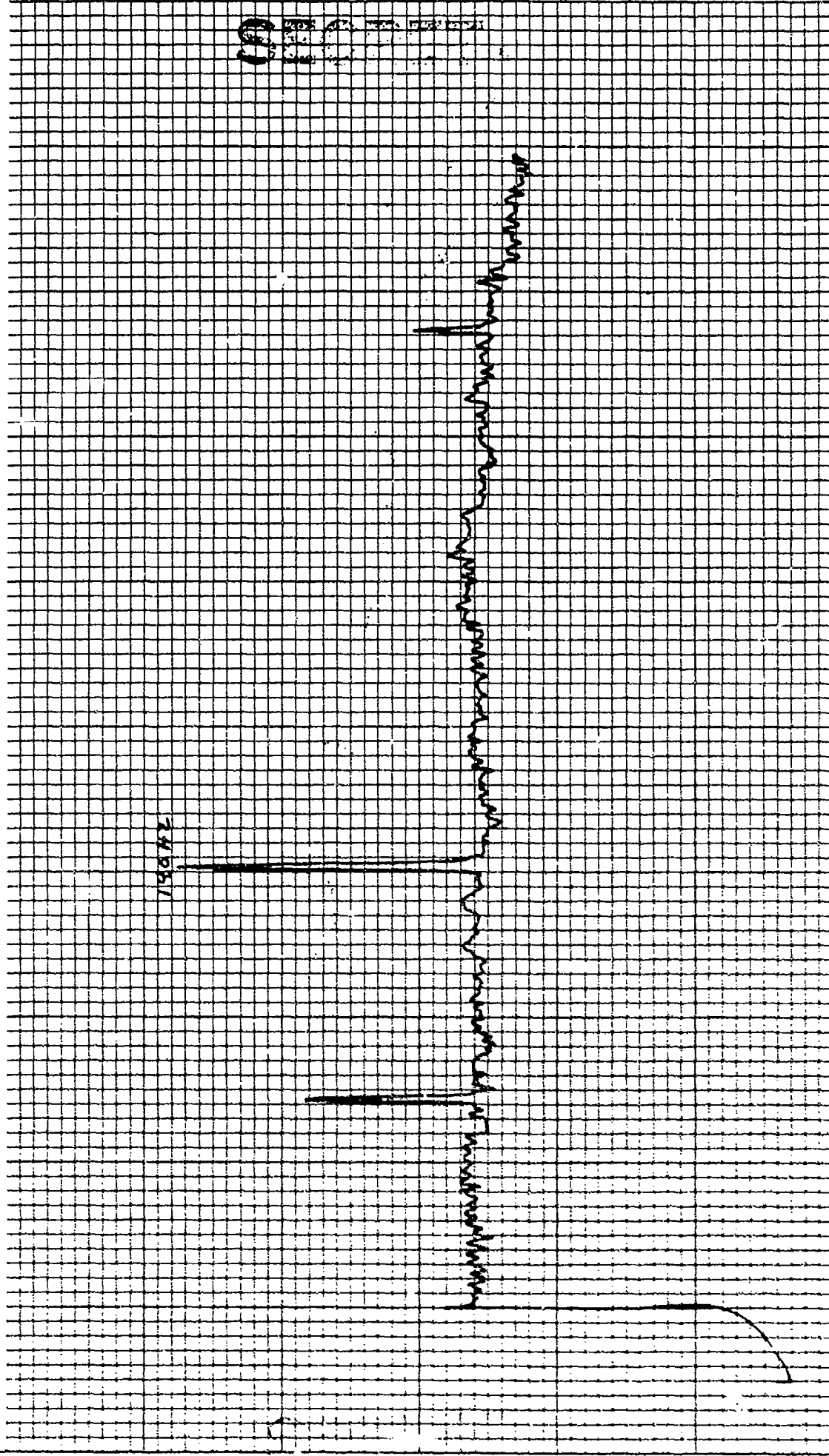


SECRET

K-E 10 X 10 TO THE INCH 2 X 10 INCHES
KEUFFEL & ESSER CO. MADE IN U.S.A.

46 0703

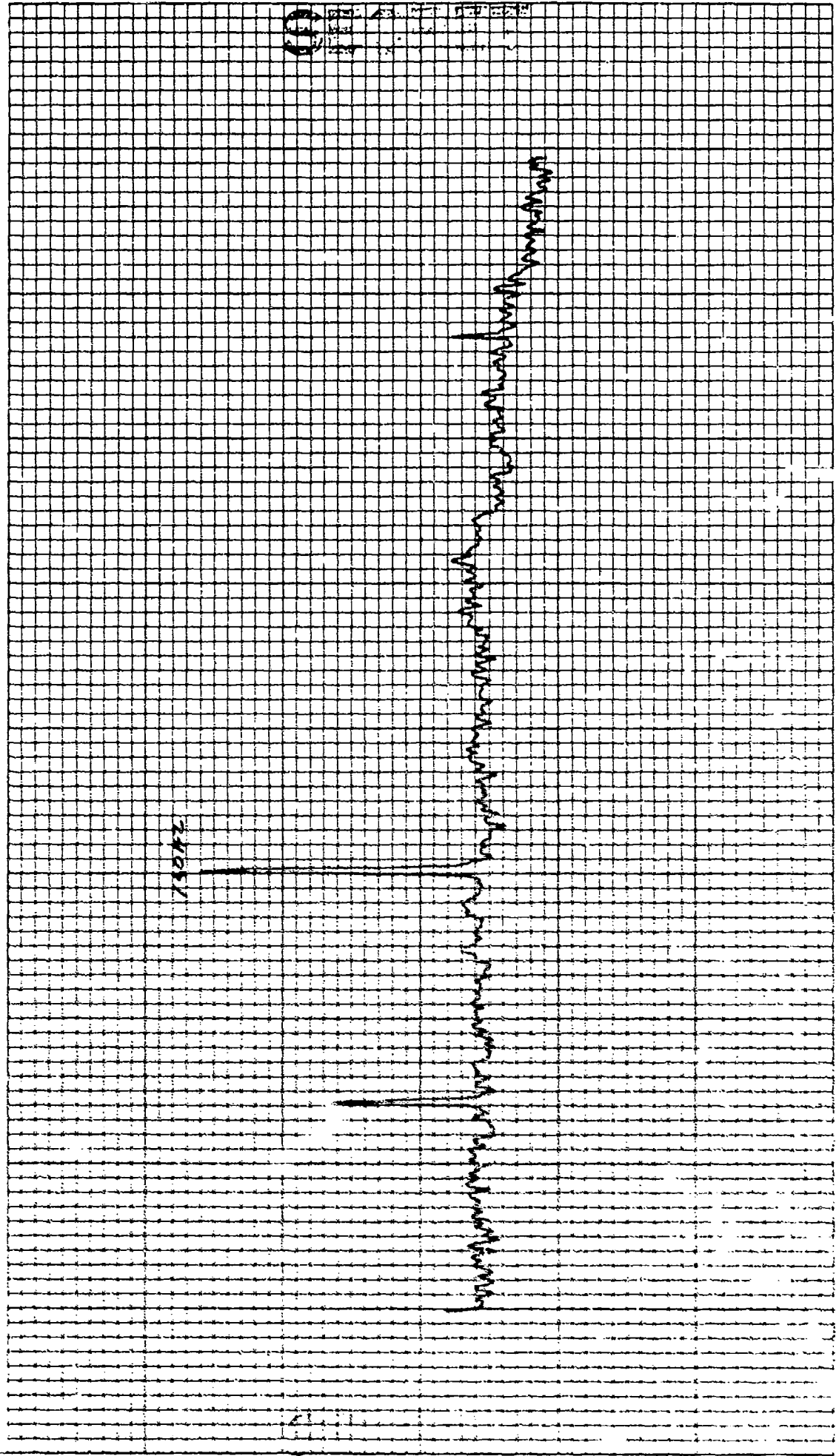
CONTROL: 0637 - 49 (DPI) DATE OF ANALYSIS: 1-6 89-26 418-53) REEL: M19 INDE X1637
BEAMFORMED SPECTRUM(ELEMENTS))
EXERCISE: BEARING STAKE DATE/TIME: 3-16-77 - 0637Z INTEGRATION TIME 320 SECS ATTN: -24 DB
CENTER FREQ: 150 HZ ANALYSIS BANDWIDTH: 1/10HZ FILTER WTG: HANNING
49 ELEMENTS +66 DEG. AZ STEERING



K-E 10 X 10 TO THE INCH 0.1 X 10 INCHES
KELLOGG & CLARK CO. MADE IN U.S.A.

46 0703

CONTROL: 0633 - 49 (DP10) DATE OF ANALYSIS: - - - INDE X/637
BEAMFORMED SPECTRUM (ELEMENTS) 1-6 4 9-26 4 08-53)
EXERCISE: BEARING STAKE DATE/TIME: 3-6-77 - 0623 Z INTEGRATION TIME 320 SECS ATTEN: -24 DB
CENTER FREQ: 150 HZ ANALYSIS BANDWIDTH: 1/10 HZ FILTER WTG: HANNING
49 ELEMENTS +60 DEG. AZ STEERING



K₀E 10 X 10 TO THE INCH • 7 X 10 INCHES
KEUFFEL & ESSER CO. MADE IN U.S.A.

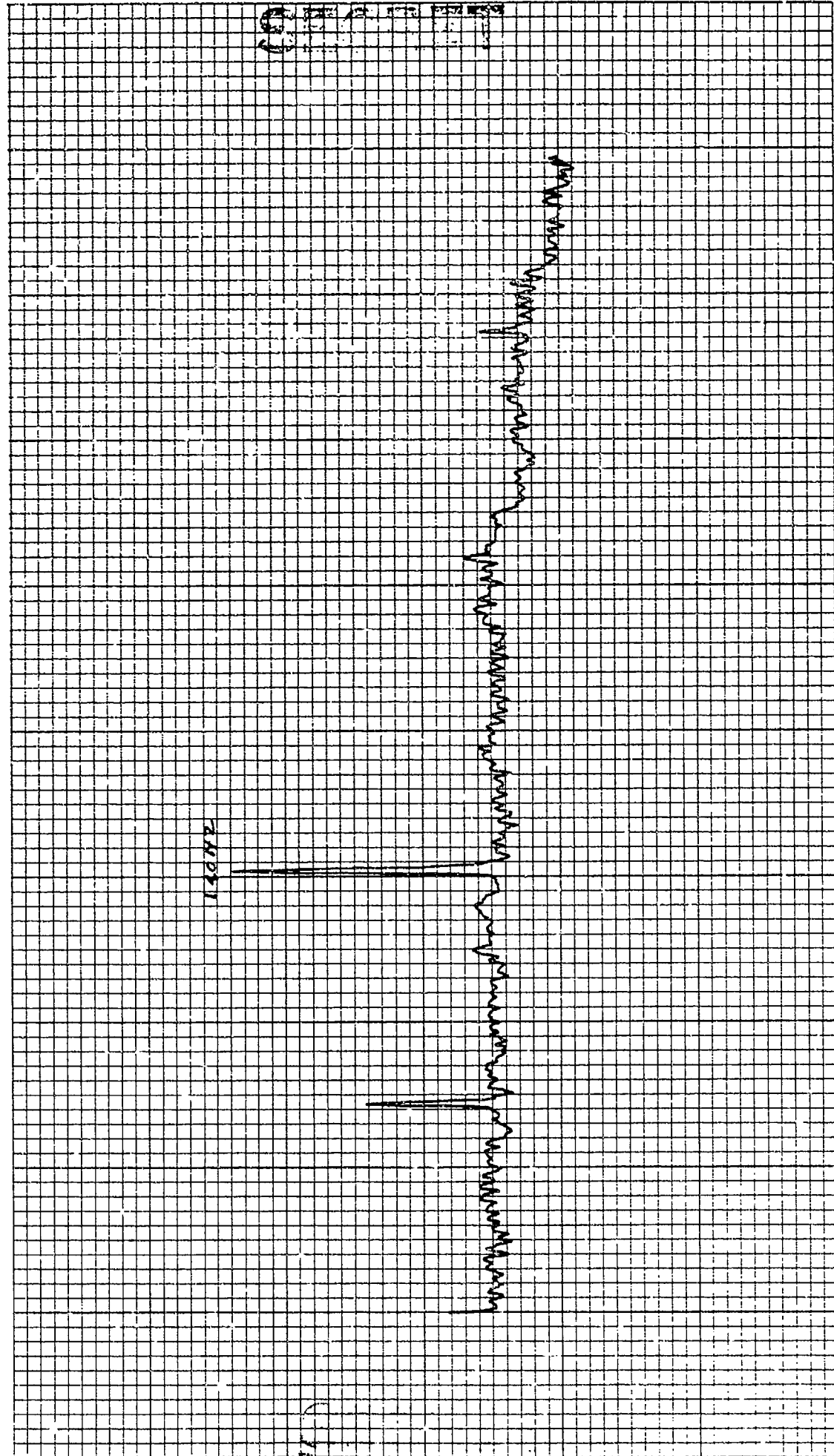
46 0703

CONTROL: 0633 - 41 (DP10)
BEAMFORMED SPECTRUM (ELEMENTS)
EXERCISE: BEARING STAKE
CENTER FREQ: 150 HZ
49 ELEMENTS

DATE OF ANALYSIS: 1-6 49-26 48-53
DATE/TIME: 316-27-0633 Z
ANALYSIS BANDWIDTH: 1/10 HZ
+70 DEG. AZ STEERING

REEL: M19
INTEGRATION TIME 320 SECS
FILTER
ATTEN: -24 DB
WTC: HANNING

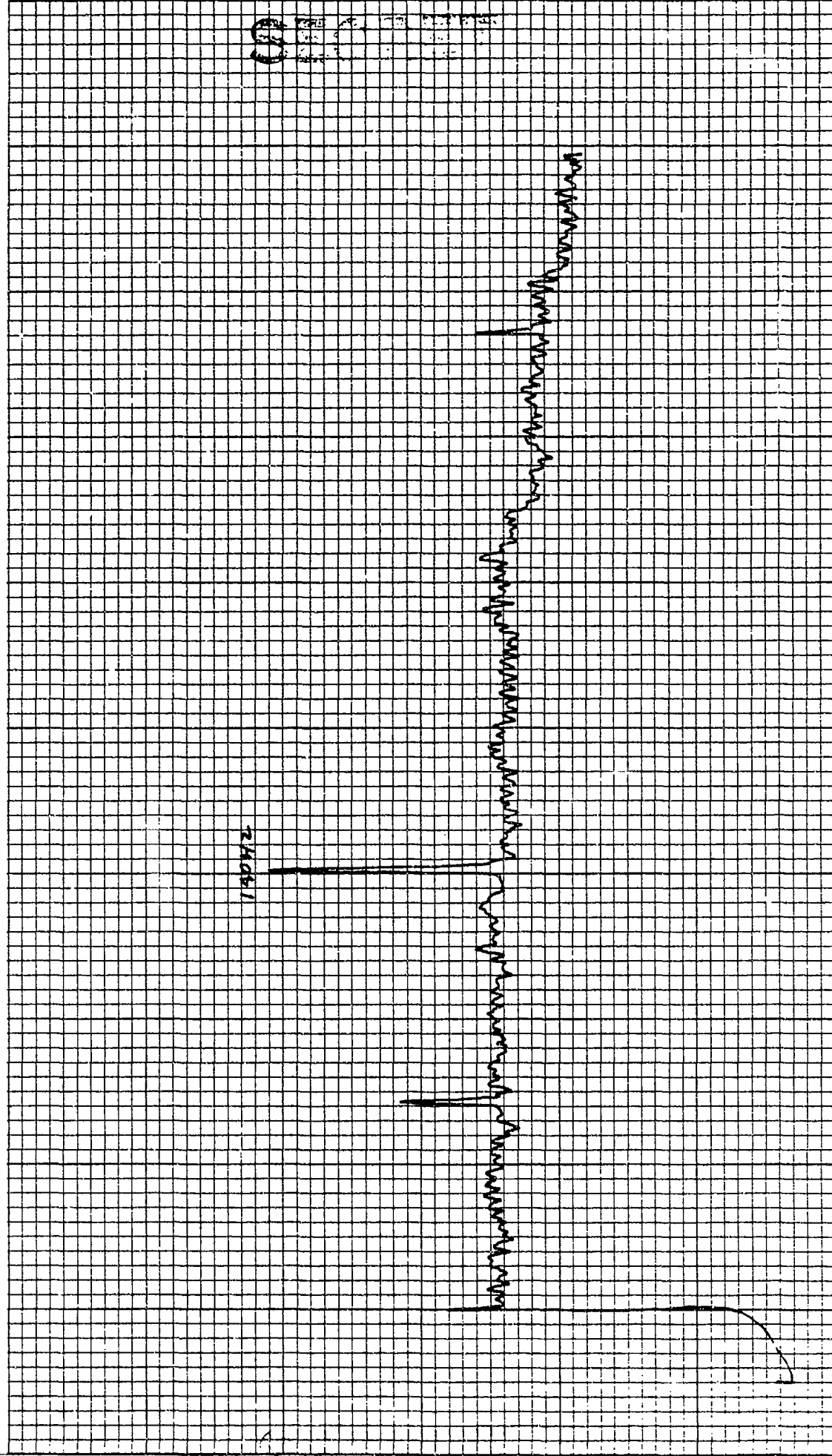
INDE X1627



K-Σ 10 X 10 TO THE INCH • 7 X 10 INCHES
KEUFFEL & ESSER CO. MADE IN U.S.A.

46 0703

CONTROL: 0633-49 (DP16) DATE OF ANALYSIS: 1-6-89-26 f 20-35 REEL: M19 INDEX: 1637
BEAMFORMED SPECTRUM (ELEMENTS) DATE/TIME: 3-16-77-0633 Z INTEGRATION TIME 320 SECS ATTN: -24 DB
EXERCISE: BEARING STAKE ANALYSIS BANDWIDTH: 1/10HZ FILTER WTG: HANNING
CENTER FREQ: 150 HZ 49 ELEMENTS +72 DEG. AZ STEERING



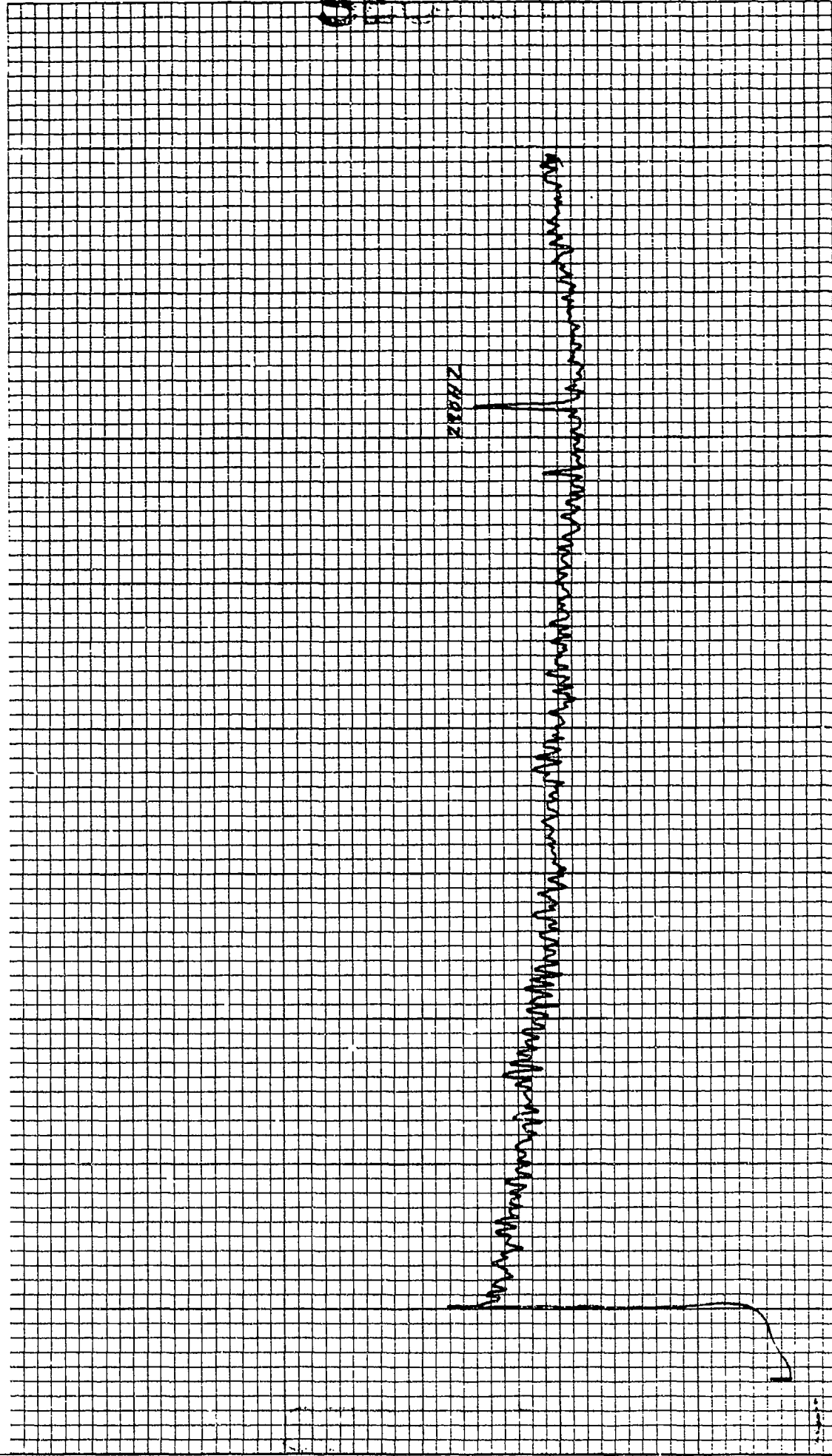
K.E 10 X 10 TO THE INCH • 7 X 10 INCHES
KEUFFEL & ESSER CO. MADE IN U.S.A.

46 0703

CONTROL: 0633 - 49 (DP10)
BEAMFORMED SPECTRUM (ELEMENTS)
EXERCISE: BEARING STAKE
CENTER FREQ: 270 HZ
49 ELEMENTS

DATE OF ANALYSIS: 1-6-79-26-29-53
DATE/TIME: 3-7-77-0633Z
ANALYSIS BANDWIDTH: 1/10HZ
+ 54 DEG. AZ STEERING

REEL: M19
INDE X/637
INTEGRATION TIME 320 SECS
FILTER
ATTEN: -24 DB
WTG: HANNING

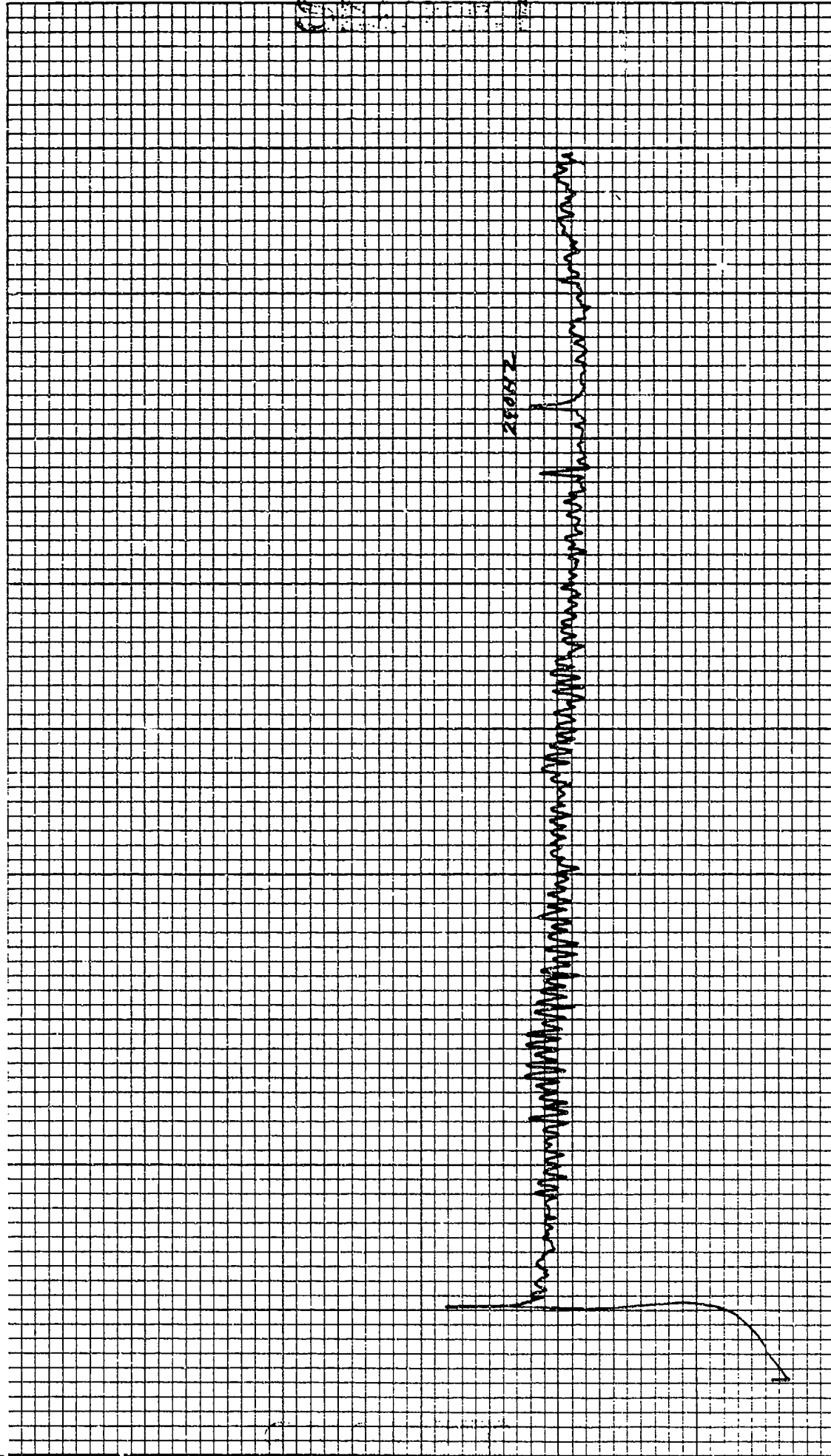


KOE 10 X 10 TO THE INCH • 7 X 10 INCHES
KEUFFEL & ESSER CO. MADE IN U.S.A.

46 0703

CONTROL: 0633 - 49 (DP10) DATE OF ANALYSIS: 1-6-68-26498-53 REEL: M19 INDE X/637
BEAMFORMED SPECTRUM(ELEMENTS) DATE/TIME: 3-7-67 - 0633 Z INTEGRATION TIME 320 SECS ATTN: 34 DB
EXERCISE: BEARING STAKE ANALYSIS BANDWIDTH: 1/10HZ FILTER WTG: HANNING
CENTER FREQ: 270 HZ + 56 DEG. AZ STEERING

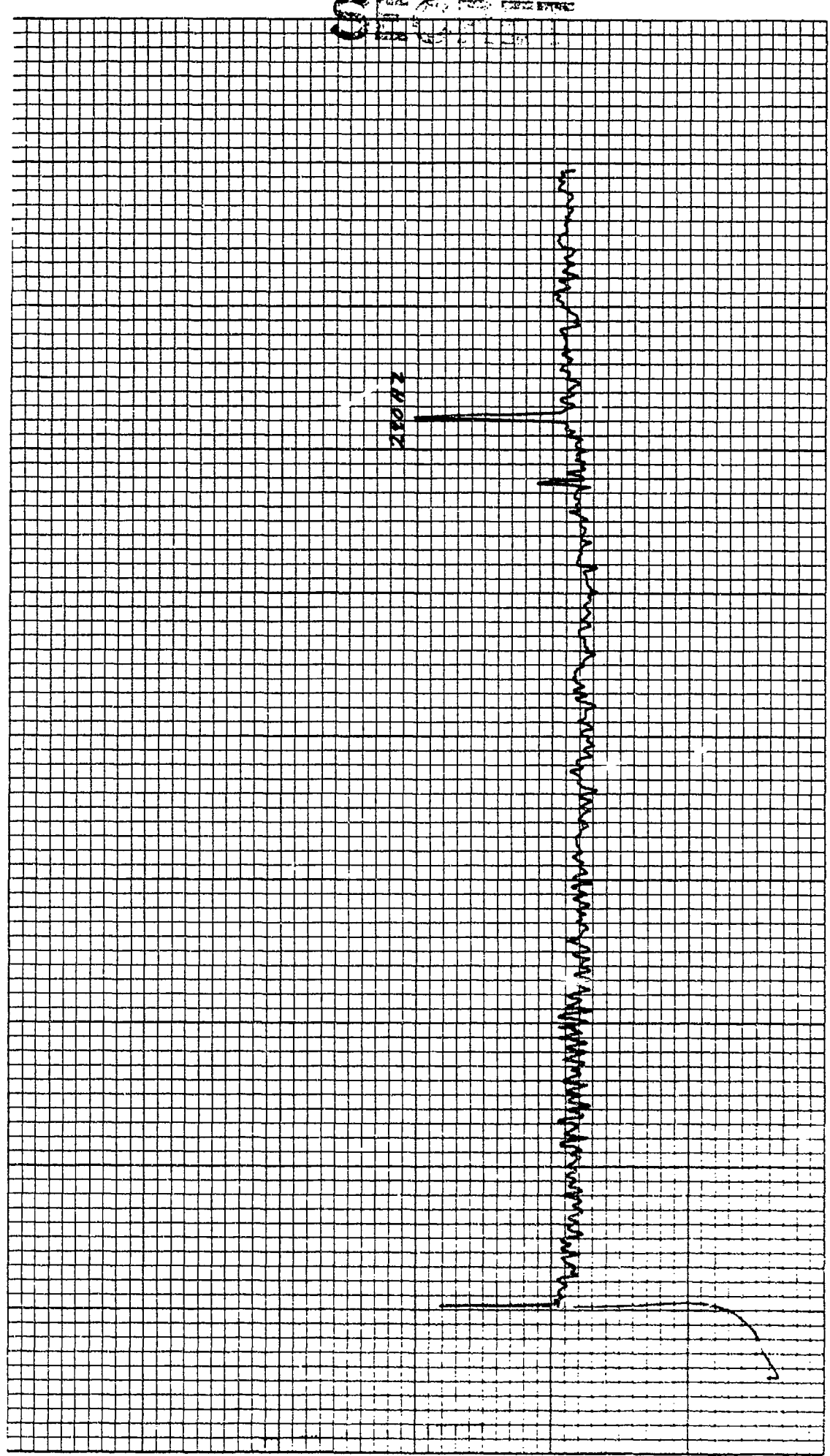
49 ELEMENTS



46 0703

DATE OF ANALYSIS: - - - - -
1-6 9-26 08-53)
DATE/TIME: 3-16-77 - 0633 Z
ANALYSIS BANDWIDTH: 1/10HZ
+50 DEG. AZ STEERING

REEL: M19 INDEX: X1637
INTEGRATION TIME 320 SECS ATTEN: 34 DB
FILTER WTG: HANNING



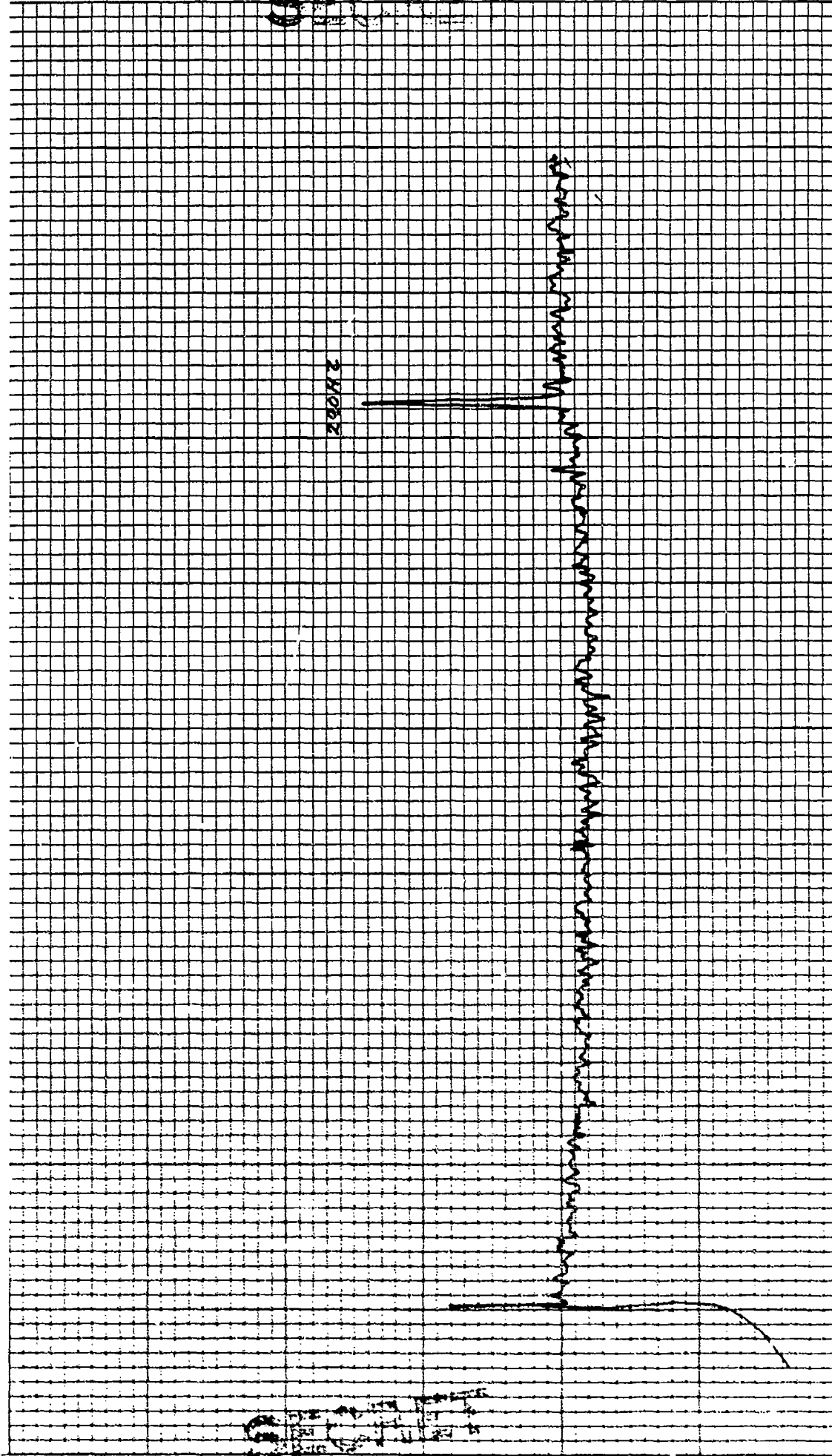
K-E 10 X 10 TO THE INCH - 7 X 10 INCHES
KEUFFEL & ESSER CO. MADE IN U.S.A.

46 0703

CONTROL: 0637 - 49 (DP10)
BEAMFORMED SPECTRUM (ELEMENTS
EXERCISE: BEARING STAKE
CENTER FREQ: 270 HZ
49 ELEMENTS

DATE OF ANALYSIS: - - -
1-69 8-26 28-35)
DATE/TIME: 3-16-77 - 0637Z
ANALYSIS BANDWIDTH: 1/10HZ
460 DEG. AZ STEERING

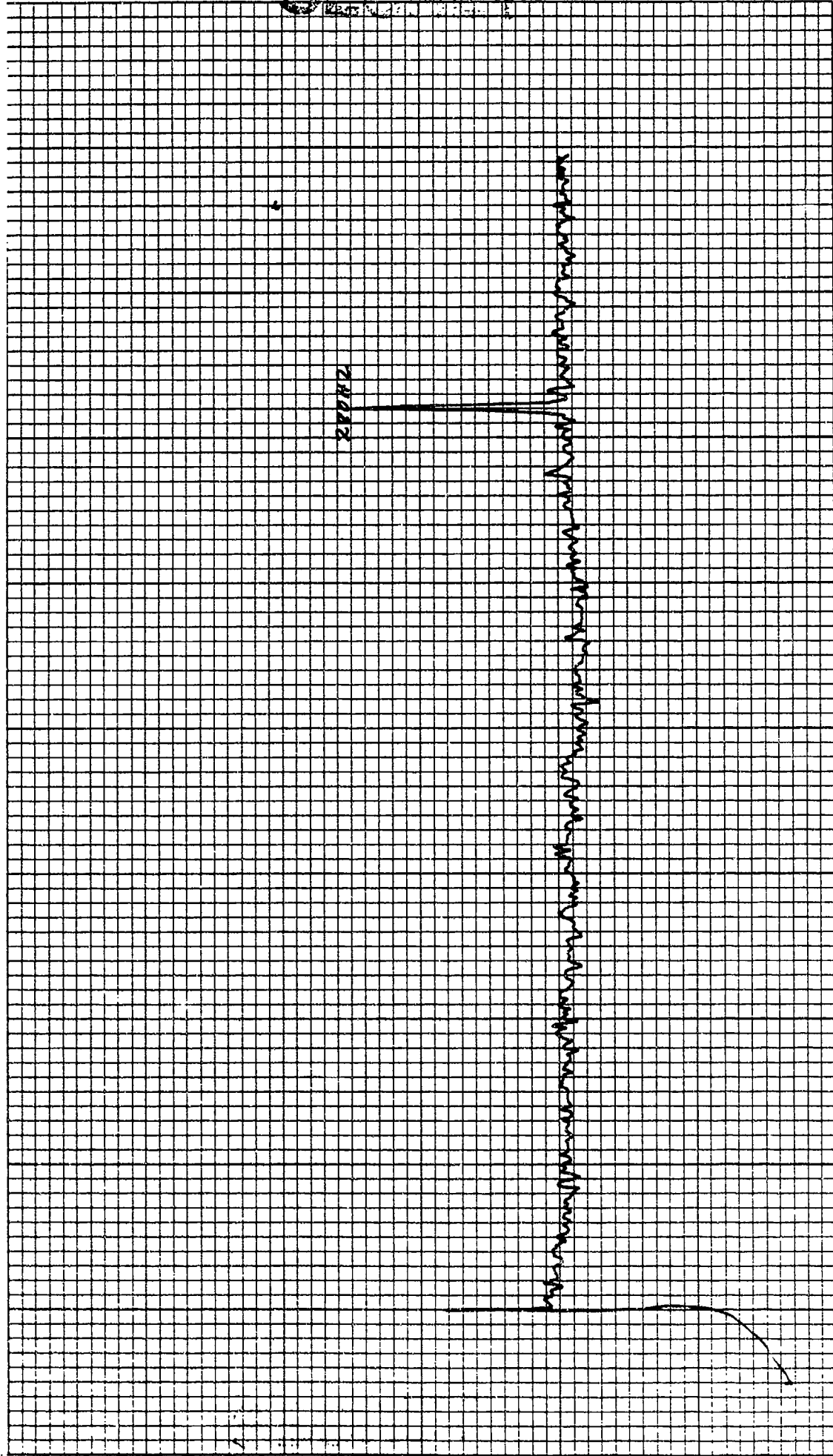
REEL: M19 INDE X 1637
INTEGRATION TIME 320 SECS
ATTEN: -24 DB
FILTER WTG: HANNING



KOE 10 X 10 TO THE INCH • 7 X 10 INCHES
KELUPPEL & ESSER CO. MADE IN U.S.A.

46 0703

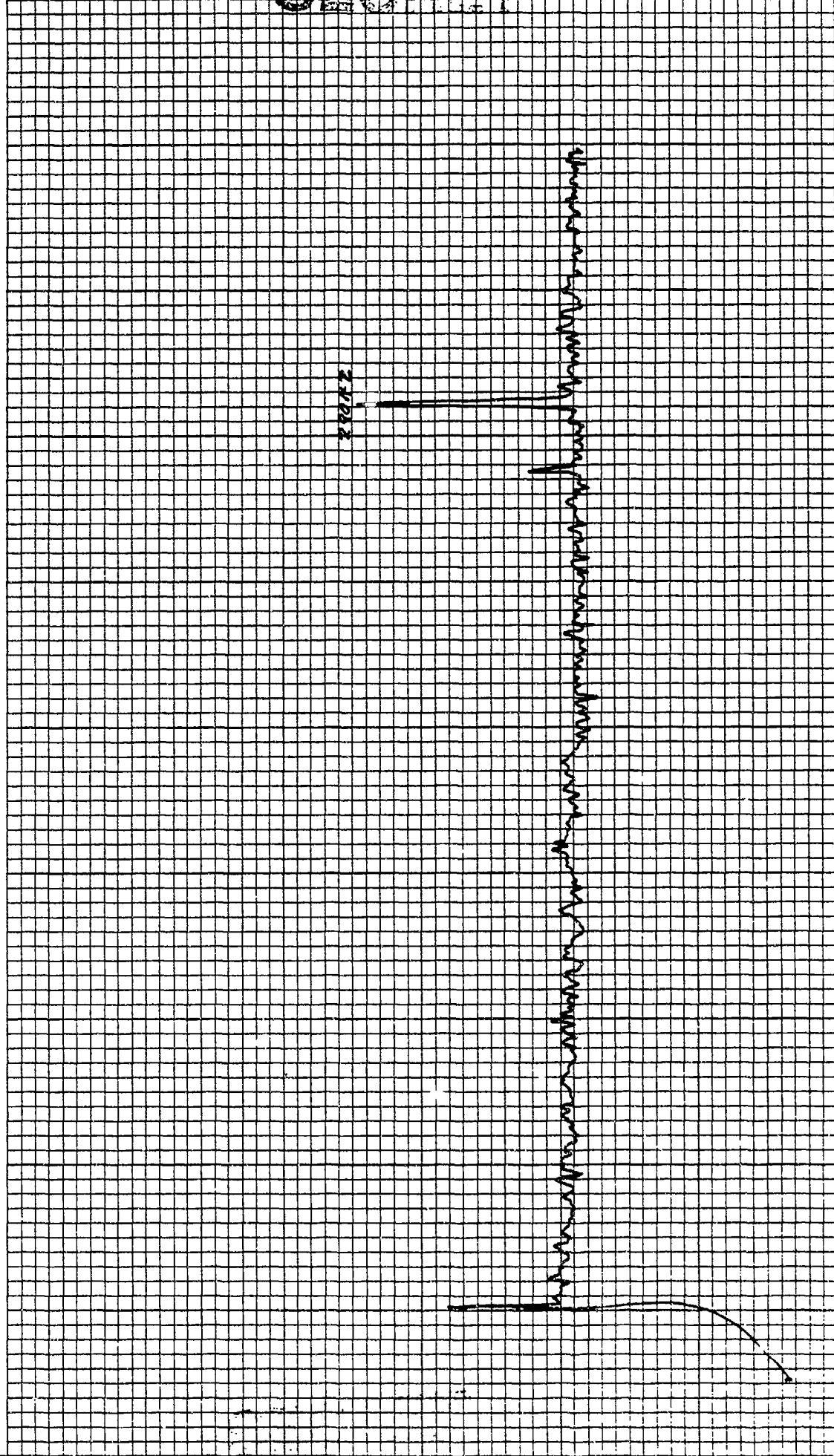
CONTROL: 0337 - 49 (DP10) DATE OF ANALYSIS: 1-6-77 - 0633 Z REEL: M19 INDE X 1637
BEAMFORMED SPECTRUM (ELEMENTS) 1-6-77 - 0633 Z INTEGRATION TIME 320 SECS ATTN: -24 DB
EXERCISE: BEARING STAKE ANALYSIS BANDWIDTH: 1/10HZ FILTER WTG: HANNING
CENTER FREQ: 270 HZ +61.5 DEG. AZ STEERING



KOE 10 X 10 TO THE INCH • 7 X 10 INCHES
KEUFFEL & ESSER CO. MADE IN U.S.A.

46 0703

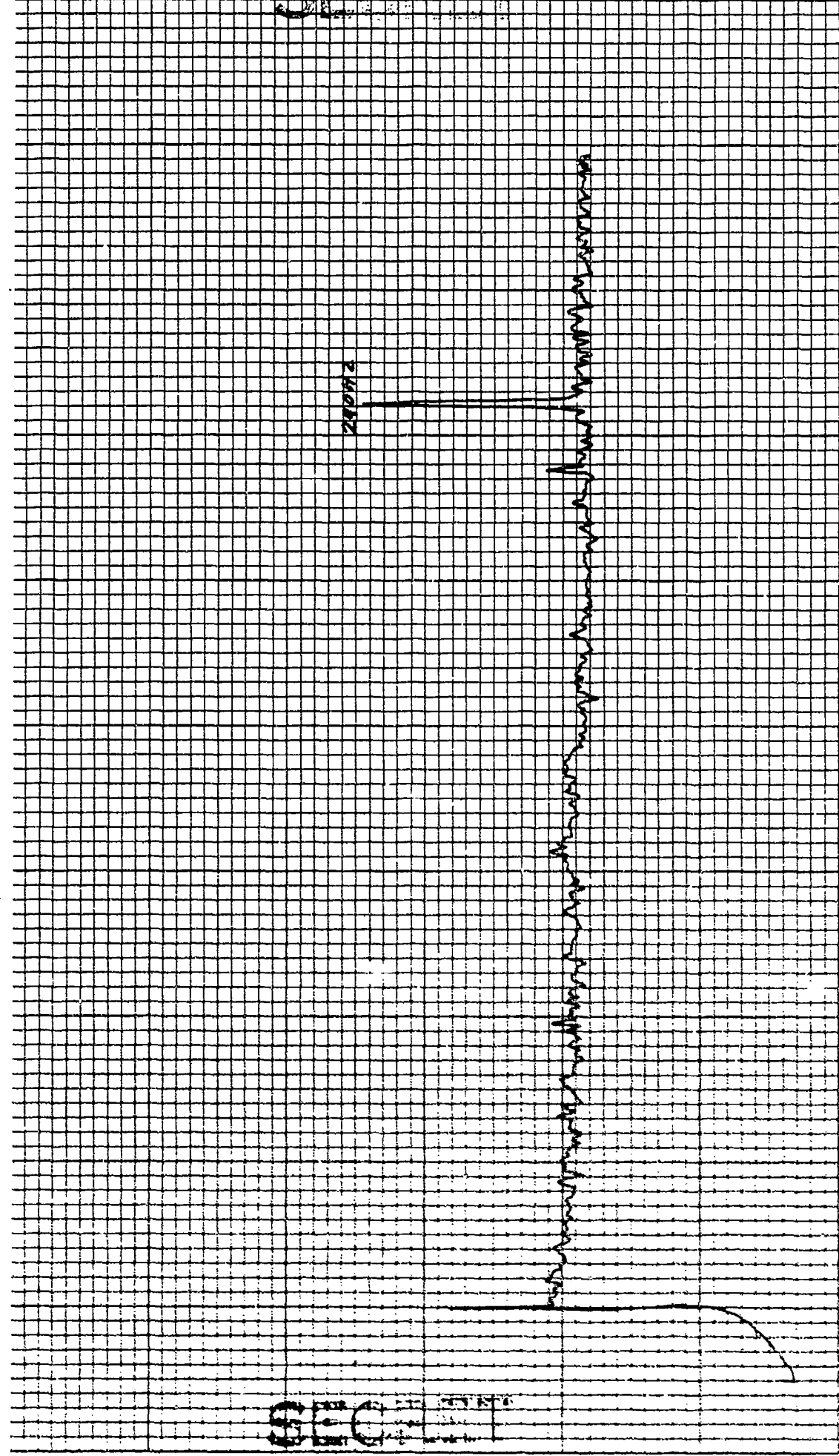
CONTROL: 0633-49 (DP10) DATE OF ANALYSIS: 1-6 4 8-26 4 08 -35 REEL: M19 INDE X/637
BEAMFORMED SPECTRUM (ELEMENTS) DATE/TIME: 3-16-77 - 0633 Z INTEGRATION TIME 320 SECS ATTN: ~24 DB
EXERCISE: BEARING STAKE ANALYSIS BANDWIDTH: 1/10 HZ FILTER WTG: HANNING
CENTER FREQ: 270 HZ 49 ELEMENTS +62 DEG. AZ STEERING



KSE 10 X 10 TO THE INCH • 7 X 10 INCHES
KEUFFEL & ESSER CO. MADE IN U.S.A.

46 0703

CONTROL: 0633-49 (DP10) DATE OF ANALYSIS: 1-6-77-0633Z REEL: M19 INDE X/637
BEAMFORMED SPECTRUM(ELEMENTS) EXERCISE: BEARING STAKE
CENTER FREQ: 270 HZ ANALYSIS BANDWIDTH: 1/10HZ INTEGRATION TIME 320 SECS ATTN: 24 DB
49 ELEMENTS +62.25 DEG. AZ STEERING FILTER WTG: HANNING

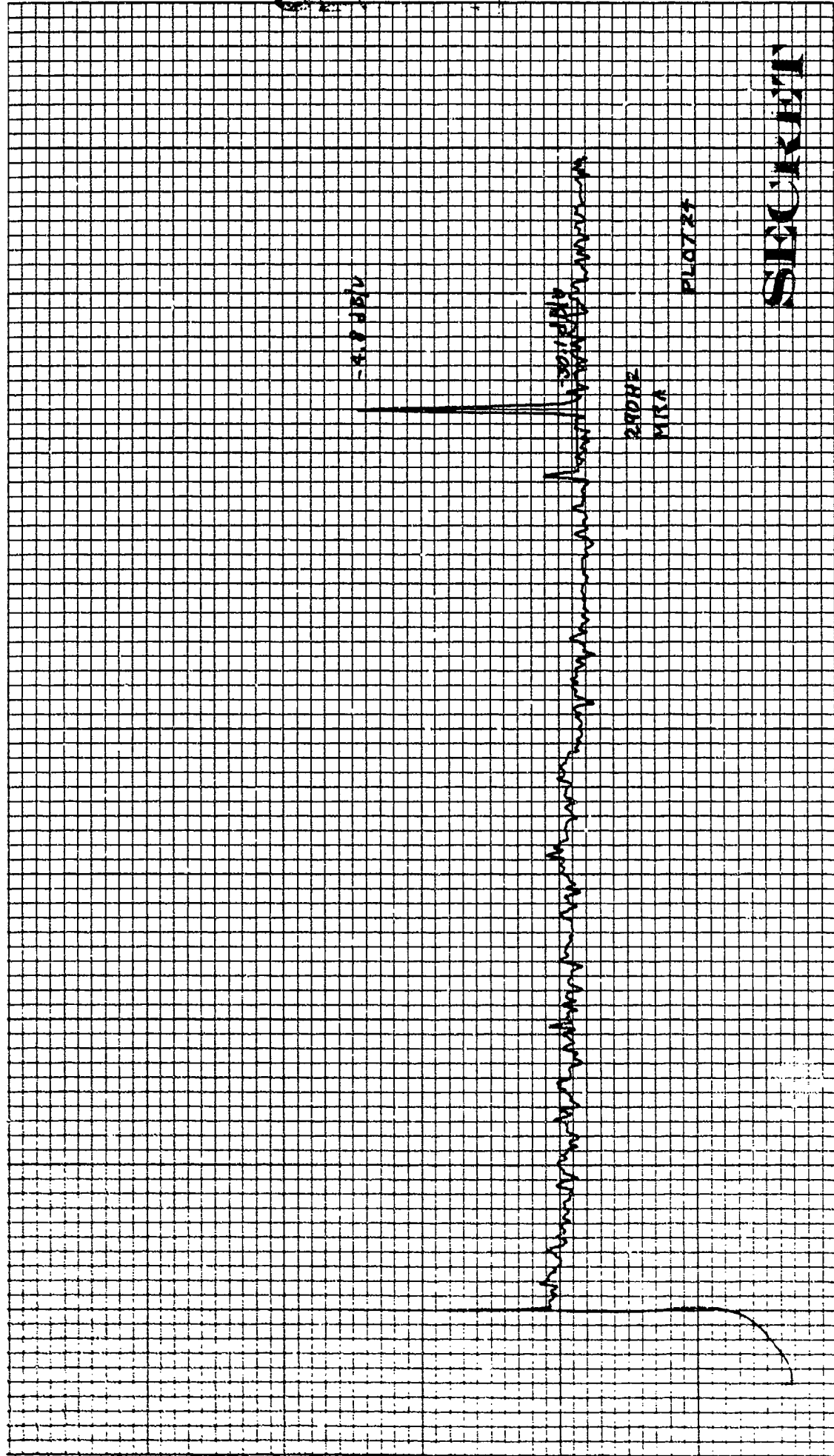


K-E 10 X 10 TO THE INCH • 7 X 10 INCHES
KLUFFEL & KESSER CO. MADE IN U.S.A.

46 0703

SECRET

CONTROL: 0633 - 49 (DP10) DATE OF ANALYSIS: _____
BEAMFORMED SPECTRUM (ELEMENTS 176 97026 24753)
EXERCISE: BEARING STAKE
CENTER FREQ: 270 HZ
49 ELEMENTS
REEL: M19 INDE X/637
INTEGRATION TIME 320 SECS ATTN: - DB
FILTER WTG: HANNING



270 Hz

308 Hz

SECRET

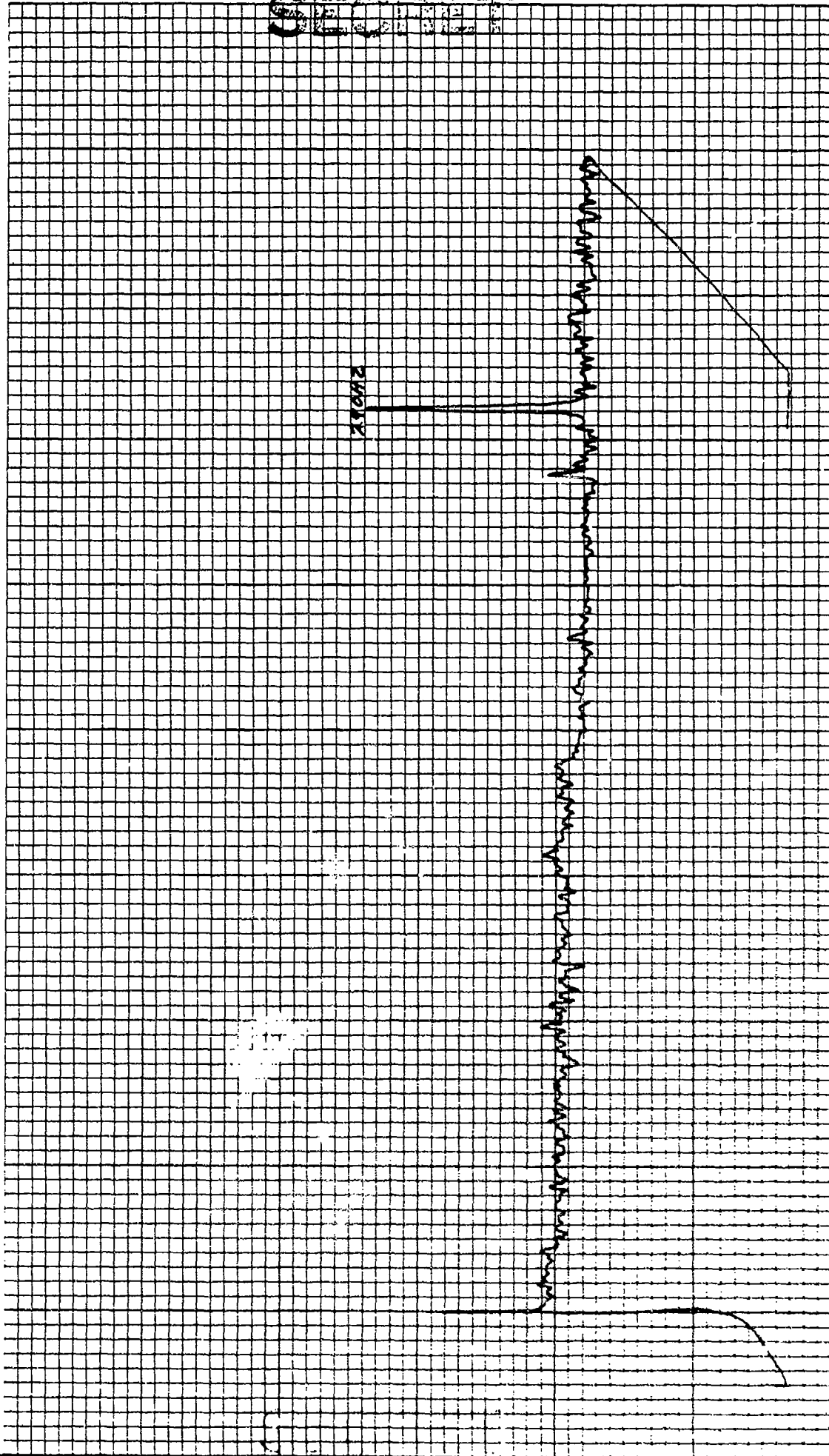
KES 10 X 10 TO THE INCH 0.7 X 10 INCHES
KEUFFEL & ESSER CO. MADE IN U.S.A.

46 0703

CONTROL: 0673 - 49 (0610) DATE OF ANALYSIS: 1-64 9-26 628-53)
BEAMFORMED SPECTRUM (ELEMENTS) DATE/TIME: 3-16-77 - 0633 Z
EXERCISE: BEARING STAKE ANALYSIS BANDWIDTH: 1/10HZ
CENTER FREQ: 270 HZ
49 ELEMENTS 63 DEG. AZ STEERING

REEL: 419 INDE X 1637

INTEGRATION TIME 320 SECS ATTN: -24 DB
FILTER WTG: HANNING



SECRET

10 X 10 TO THE INCHES - 10 INCHES
REPT. 10 X 10 TO THE INCHES - 10 INCHES

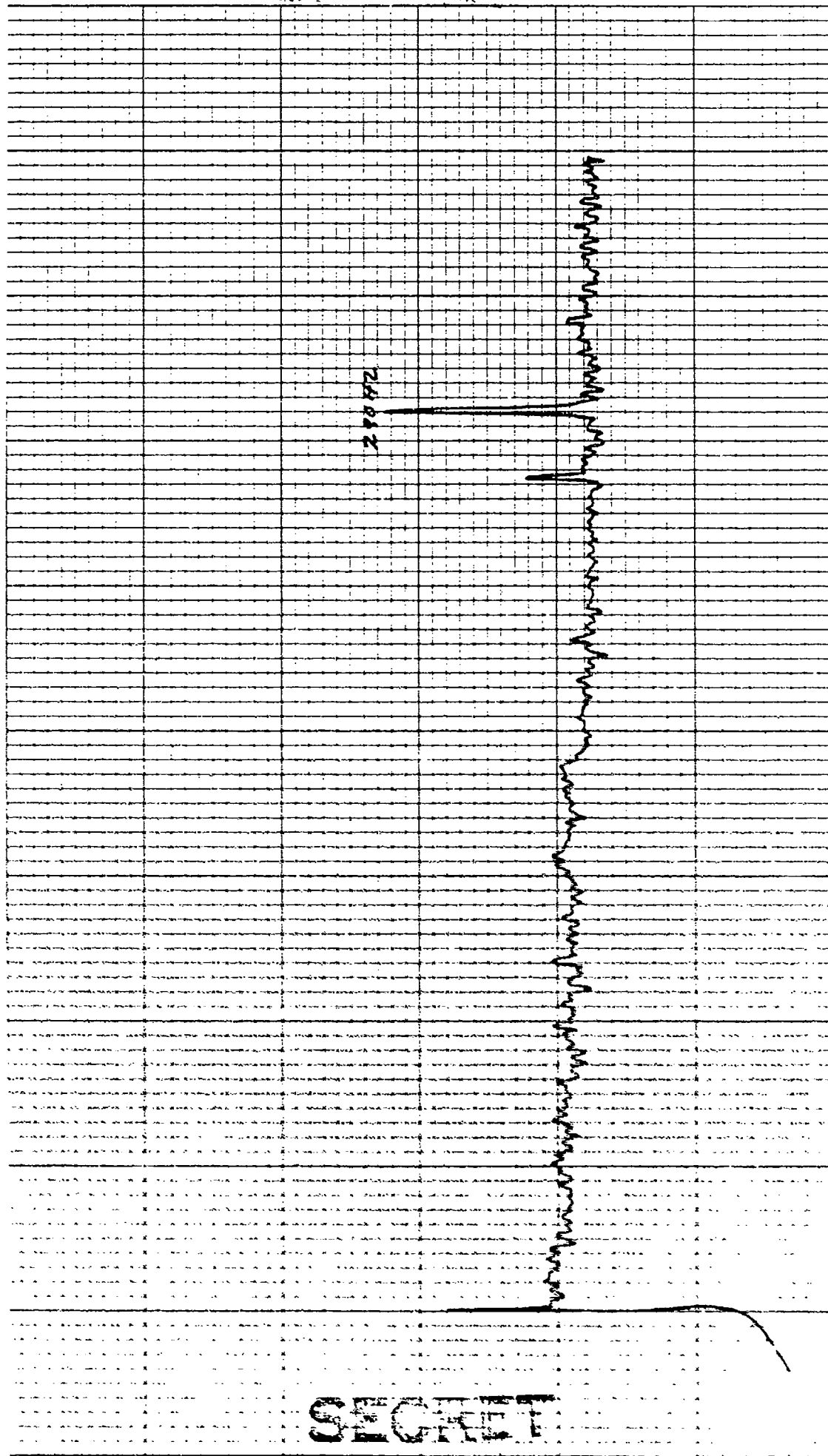
46 0703

CONTROL: 0637 - 49 (DP10)
BEAMFORMED SPECTRUM (ELEMENTS)
EXERCISE: BEARING STAKE
CENTER FREQ: 270 HZ
49 ELEMENTS

DATE OF ANALYSIS: - - -
1-64 9-26-77-35)
DATE/TIME: 3-6-77-0633Z
ANALYSIS BANDWIDTH: 1/10HZ
+64 DEC. AZ STEERING

REEL: M19
INTEGRATION TIME 320 SECS
FILTER
ATTN: -34DB
WTG: HANNING

INDEX 1637



SECRET

KSE 10 X 10 TO THE INCH • 7 X 10 INCHES
MELPUK & ESTER CO. MADE IN U.S.A.

46 0703

CONTROL: 0633 - 49 QPD)
BEAMFORMED SPECTRUM(ELEMENTS
EXERCISE: BEARING STAKE
CENTER FREQ: 270 HZ
49 ELEMENTS

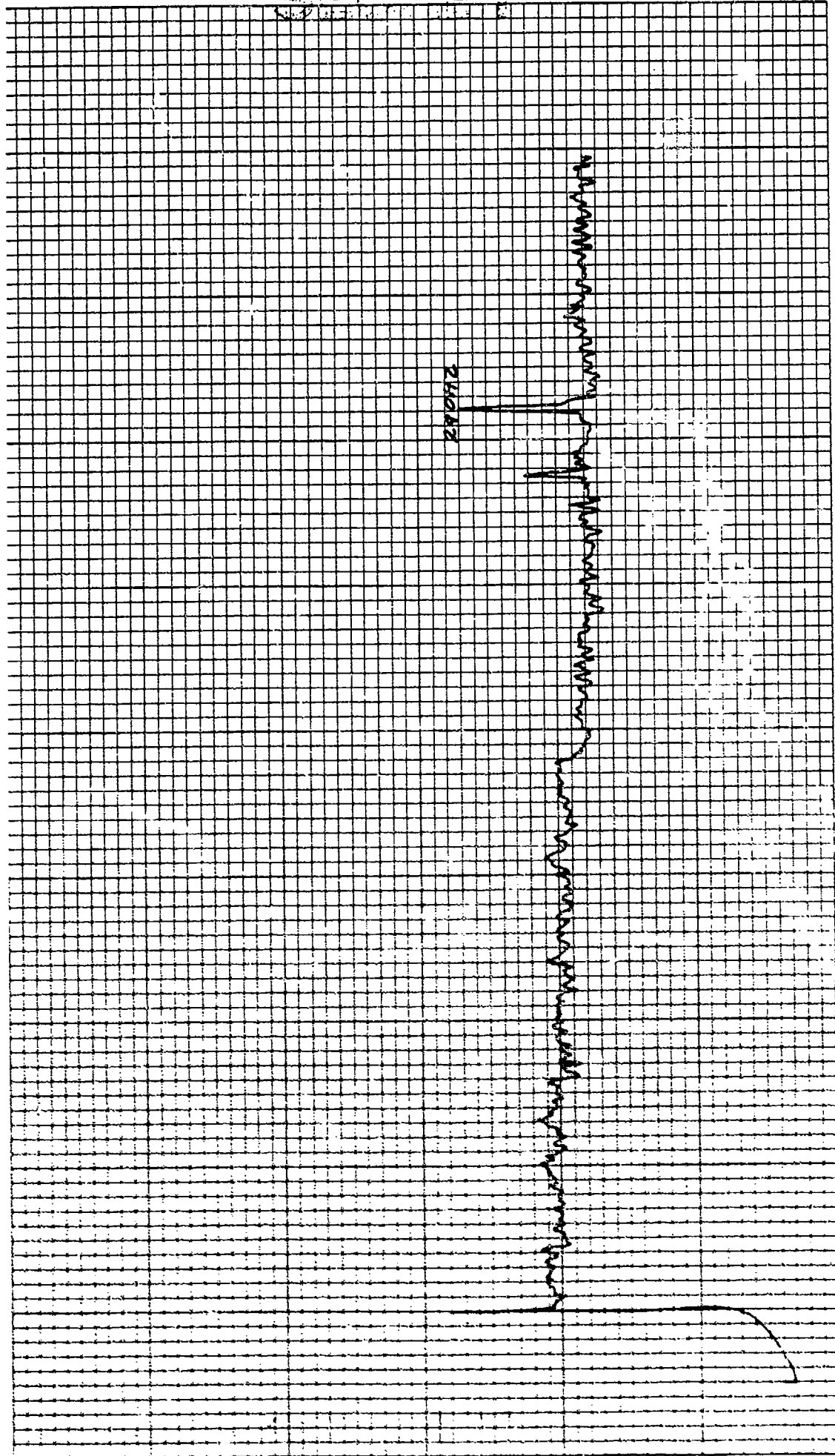
DATE OF ANALYSIS: - - -
1-649-26 x 29-53)
DATE/TIME: 3-16-77 - 0633 Z
ANALYSIS BANDWIDTH: 1/10HZ
+66 DEG. AZ STEERING

REEL: M19

INDE X1637

INTEGRATION TIME 320 SECS
FILTER

ATTN: -24 DB
WTG: HANNING



46 0703

DATE OF ANALYSIS: - - -
1-6 9-26 29-53)
DATE/TIME: 3-16-77 - 0633Z
ANALYSIS BANDWIDTH: 1/10HZ
+60 DEG. AZ STEERING

REEL: M19 INDEX X1637
INTEGRATION TIME 320 SECS ATTN: -24 DB
FILTER WTG: HANNING

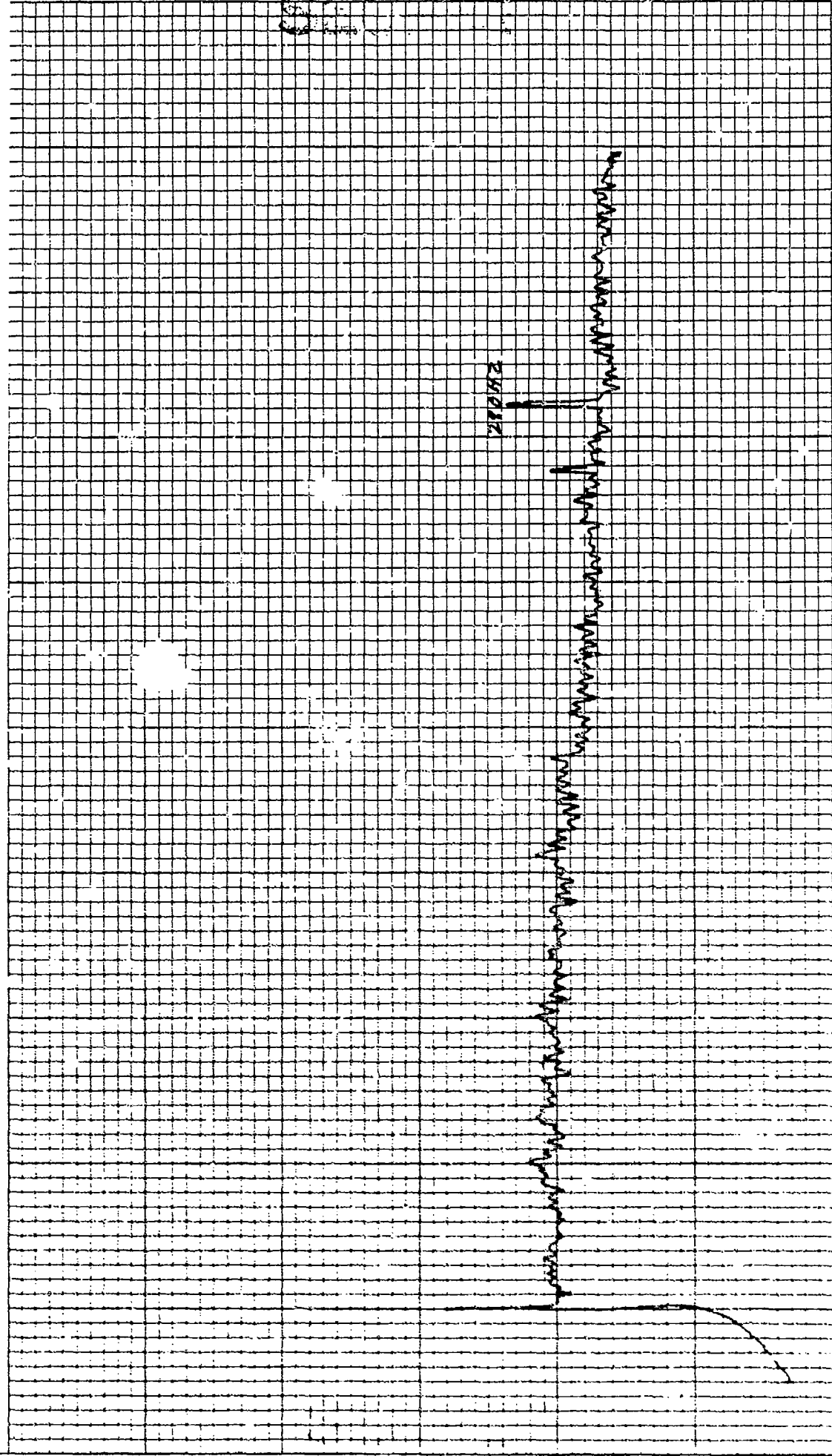
REEL: 419
INDEX: 1637

ATTN: -24 DB
WTG: HANNING

49 ELEMENTS

468 DEC. AZ STEERING

CONTROL: 0633-49 (DP10) DATE OF ANALYSIS: 1-689-26 829-83) REEL: 4/9 INDE X/672
BEAMFORMED SPECTRUM(ELEMENTS) DATE/TIME: 3-7677-0633 Z INTEGRATION TIME 320 SECS ATTN: 2#DB
EXERCISE: BEARING STAKE ANALYSIS BANDWIDTH: 1/10HZ FILTER WTG: HANNING
CENTER FREQ: 220 HZ
49 ELEMENTS +70 DEG. AZ STEERING



KOE 10 X 10 TO TIME INCH 2 X 10 INCHES
MELUFEL & LUSHER CO. MADE IN U.S.A.

46 0703

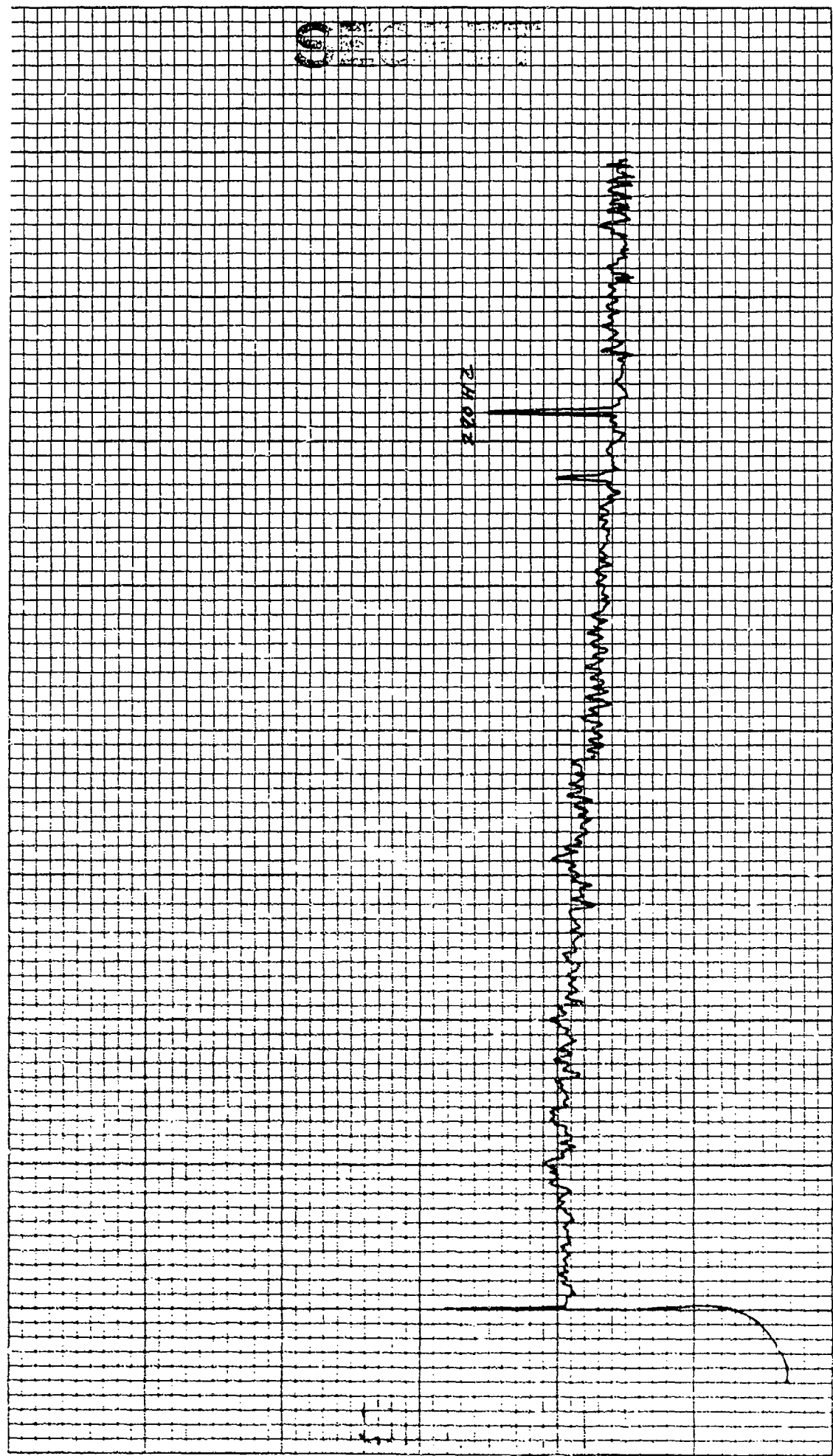
CONTROL: 0623 - 49 (DP10)
BEAMFORMED SPECTRUM (ELEMENTS)
EXERCISE: BEARING STAKE
CENTER FREQ: 270 HZ
49 ELEMENTS

DATE OF ANALYSIS: 1-14-77 20-53)
DATE/TIME: 3-16-77 - 0633 Z
ANALYSIS LANDWIDTH: 1/10 HZ
+ 72 DEG. AZ STEERING

REEL: M19
INDE X1637

INTEGRATION TIME 320 SECS
FILTER WTG: HANNING

ATTEN: -29 DB



NOISE SPECTRAL DENSITY CALCULATIONS FOR SPRAY/BEARING STAKE (U)

DATA POINT 11 DATE 3-16-77 TIME 0935Z

FREQUENCY 140 HZ

INDICATED NOISE LEVEL dBV $\frac{1}{10}$ ABW

-50.0

SYSTEM SENSITIVITY dB/μB

-(-12) = -38.0

BANDWIDTH CONVERSION TO 1 HZ BAND

+8.2 = -29.8

CONVERSION TO dBreμPa/1HZ

+100 = +70.2

UNCLASSIFIED

UNCLASSIFIED

NOISE SPECTRAL DENSITY CALCULATIONS FOR SPRAY/BEARING STAKE (U)

DATA POINT 11 DATE 3-16-77 TIME 0935Z

FREQUENCY 290 HZ

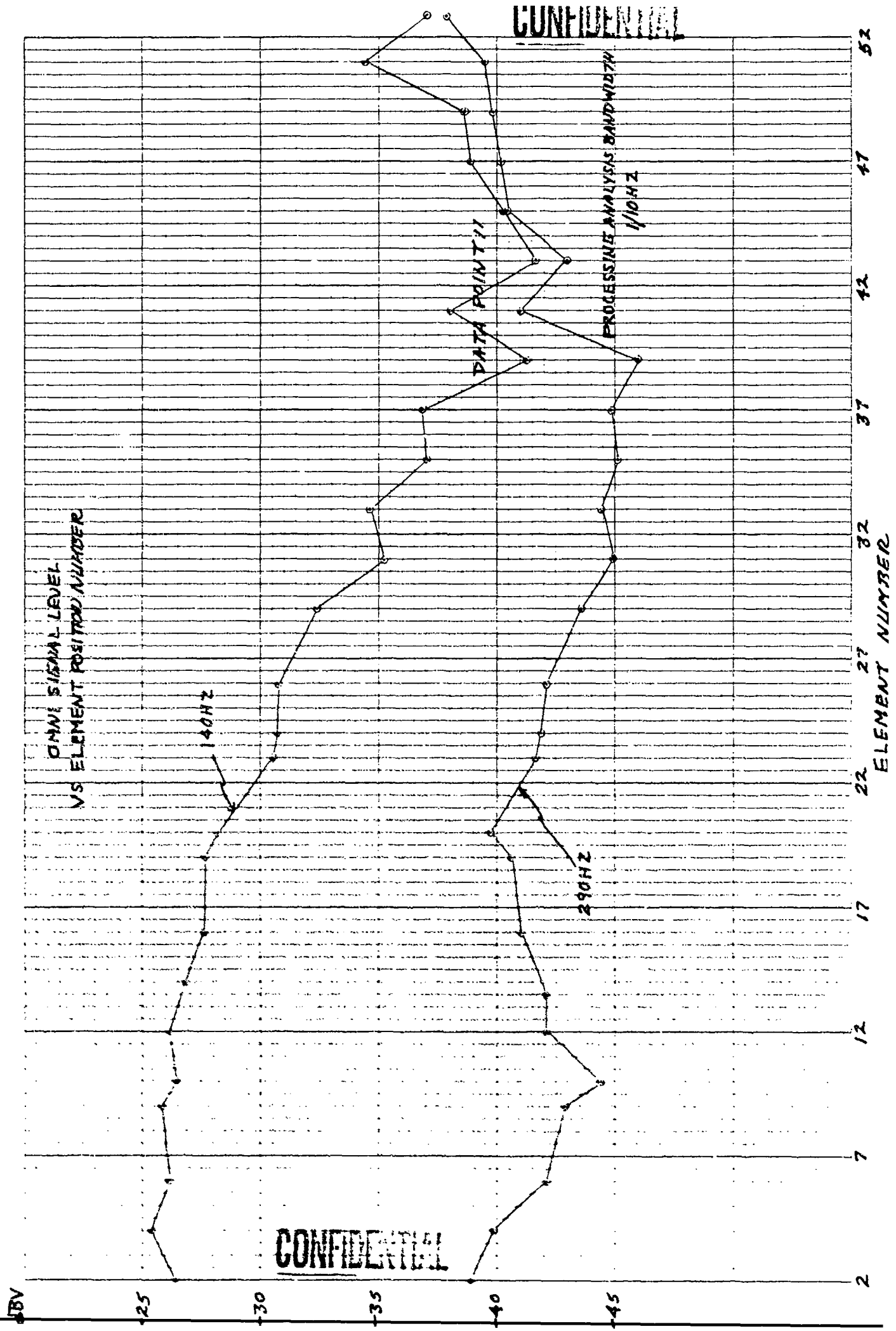
INDICATED NOISE LEVEL dBV $\frac{1}{10}$ ABW	<u>-54.0</u>
SYSTEM SENSITIVITY dB/ μ B	<u>-(-8)</u> = <u>-46.0</u>
BANDWIDTH CONVERSION TO 1 HZ BAND	<u>+6.2</u> = <u>-37.8</u>
CONVERSION TO dBre μ Pa/1Hz	<u>+100</u> = <u>+62.2</u>

UNCLASSIFIED

UNCLASSIFIED

46 0703

10E 10 X 10 TO THE INCHES
REURTEL 6, 10-24-58 CC. WITH DAU.



10 X 10 TO THE INCH • 1 X 10 INCHES
HEUFFEL & ESSER CO. MADE IN U.S.A.

46 0703

CONTROL: 3-16-0935 (27)
OMNI SPECTRUM (ELEMENT 2)
EXERCISE: BEARING STAKE
CENTER FREQ: 150 HZ
1 ELEMENT

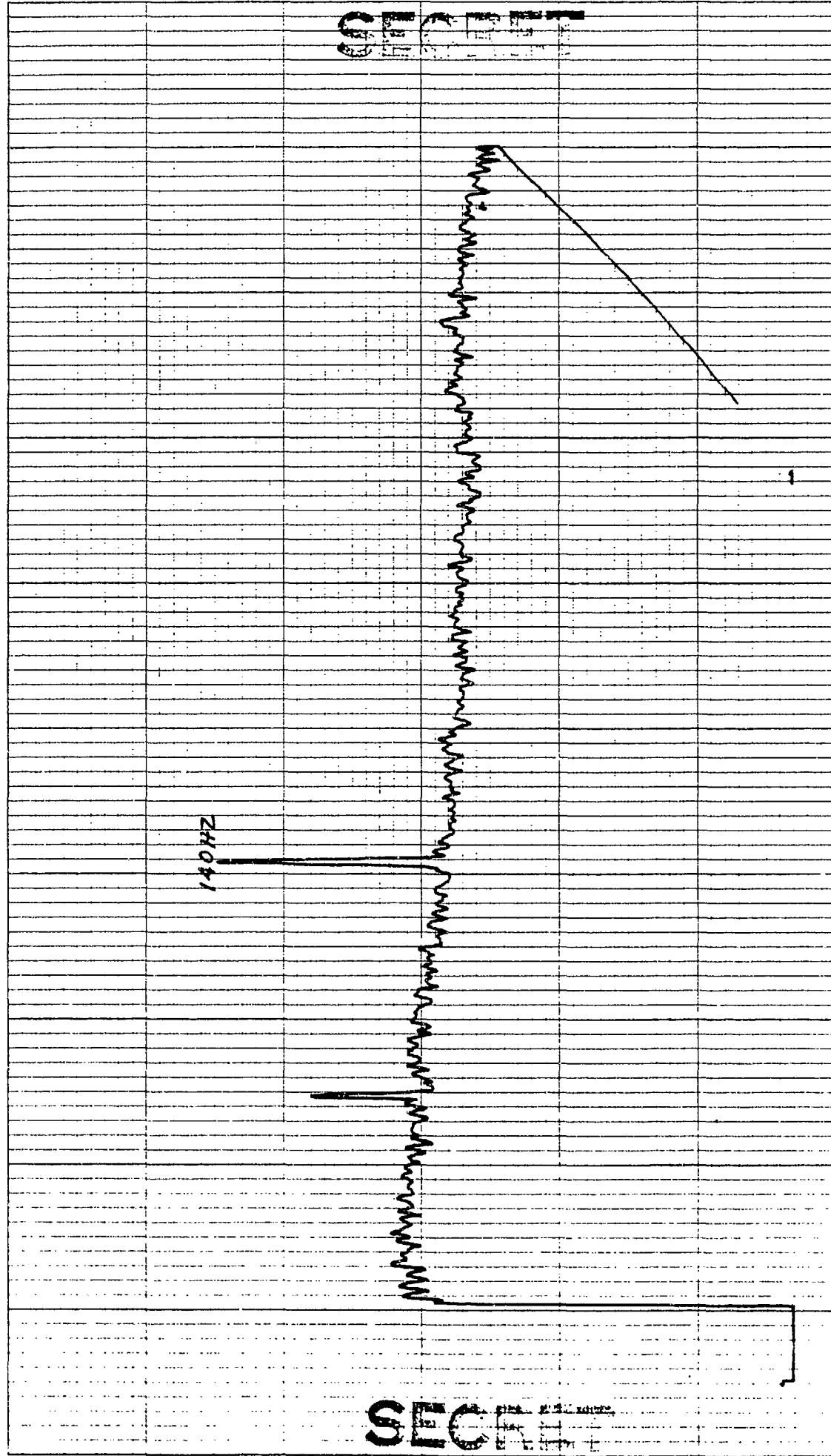
DATE OF ANALYSIS:

DATE/TIME: 3-16-77-0935 Z
ANALYSIS BANDWIDTH: 1/10 HZ
— DEG AZ STEERING

REEL: M22

INDEX 566

INTEGRATION TIME 320 SECS
FILTER
ATTN: DB
WTG: HANNING



KSE 10 X 10 TO THE INCH 7 X 10 INCHES
KEUFFEL & ESSER CO. MADE IN U.S.A.

46 0703

CONTROL: 3-16-0935 (28)
OMNI SPECTRUM (ELEMENT 4)
EXERCISE: BEARING STAKE
CENTER FREQ: 150 HZ
1 ELEMENT

DATE OF ANALYSIS:

DATE/TIME: 3-16-77 - 0935 Z
ANALYSIS BANDWIDTH: 1/10 HZ
 DEG AZ STEERING

REEL: M22 INDEX 566

INTEGRATION TIME 320 SECS
FILTER ATTN: — DB
WTG: HANNING

140 HZ

SECRET

SECRET

10 X 10 TO THE INCH • 7 X 10 INCHES
KEUFFEL & ESSER CO. MADE IN U.S.A.

46 0703

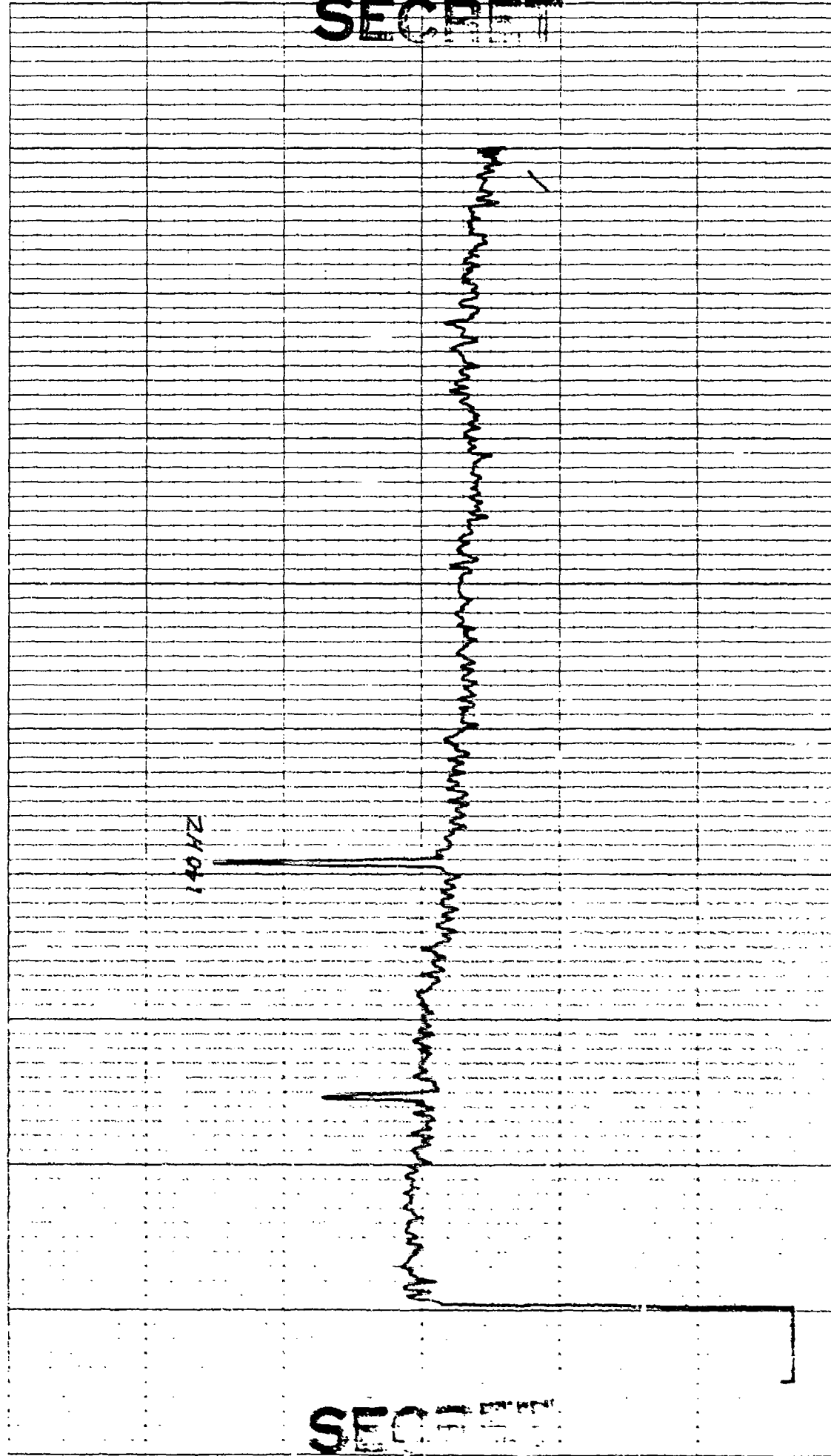
CONTROL: 3-16 -0935 (29)
OMNI SPECTRUM (ELEMENT 6)
EXERCISE: BEARING STAKE
CENTER FREQ: 150 HZ
1 ELEMENT

DATE OF ANALYSIS:

DATE/TIME: 3-16-77 -0935 Z
ANALYSIS BANDWIDTH: 1/10 HZ
— DEG AZ STEERING

REEL: M22 INDEX 566

INTEGRATION TIME 320 SECS
FILTER
ATTN: — DB
WTG: HANNING



46 0703

INDEX 566

REEL: M22

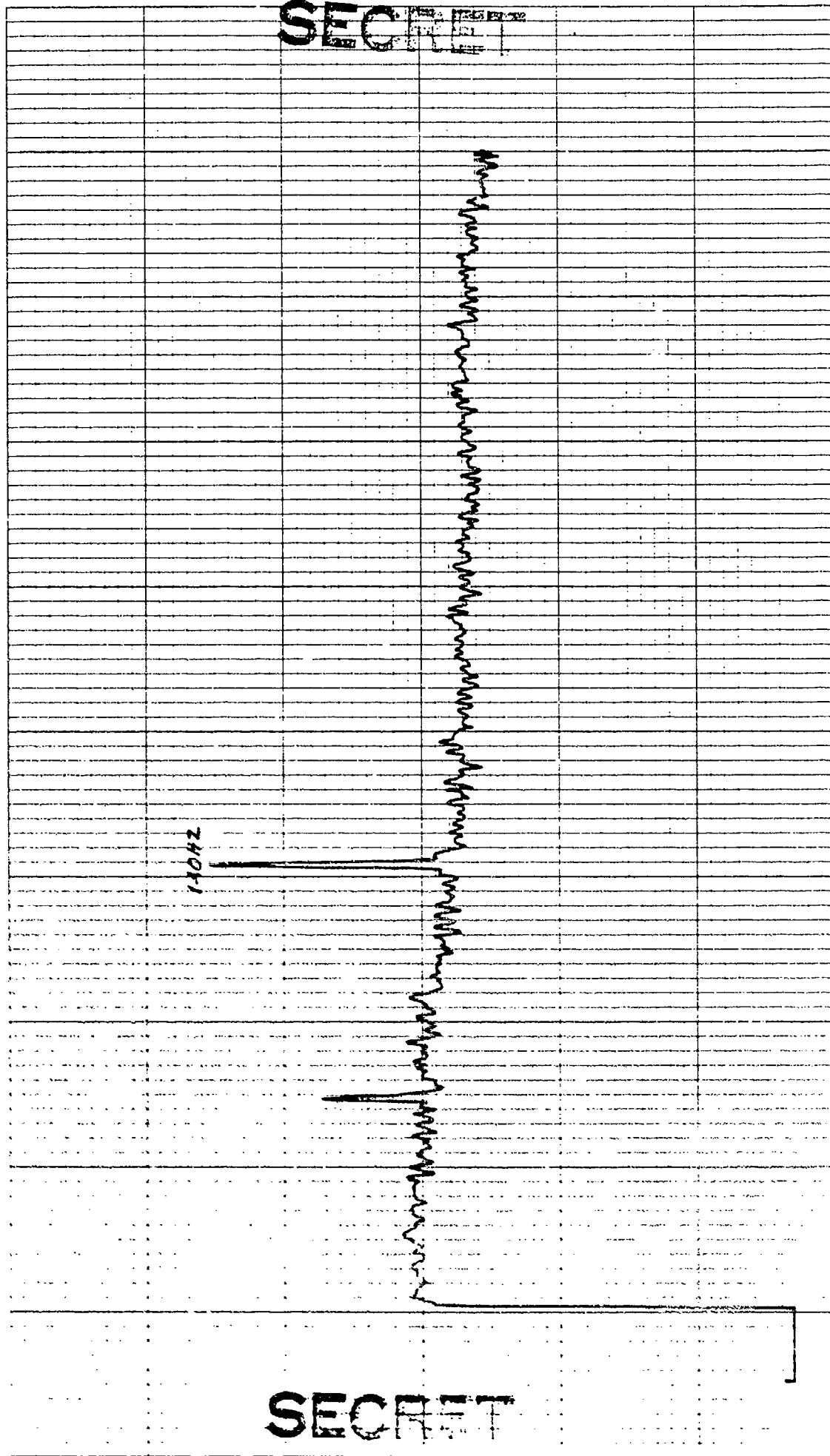
DATE OF ANALYSIS:

DATE/TIME: 3-16-77 - 0935 Z
ANALYSIS BANDWIDTH: 1/10HZ
----- DEG AZ STEERING

INTEGRATION TIME 320 SECS ATEN: — DB
 FILTER WTC: HANNING

SECRET

SECRET



KSE 10 X 10 TO THE INCH • 7 X 10 INCHES
KEUFFEL & ESSER CO. MADE IN U.S.A.

46 0703

CONTROL: 3-16 - 0935 (31)
OMNI SPECTRUM (ELEMENT 10)
EXERCISE: BEARING STAKE
CENTER FREQ: 150 HZ
1 ELEMENT

DATE OF ANALYSIS:

DATE/TIME: 3-16-77 - 0935 Z

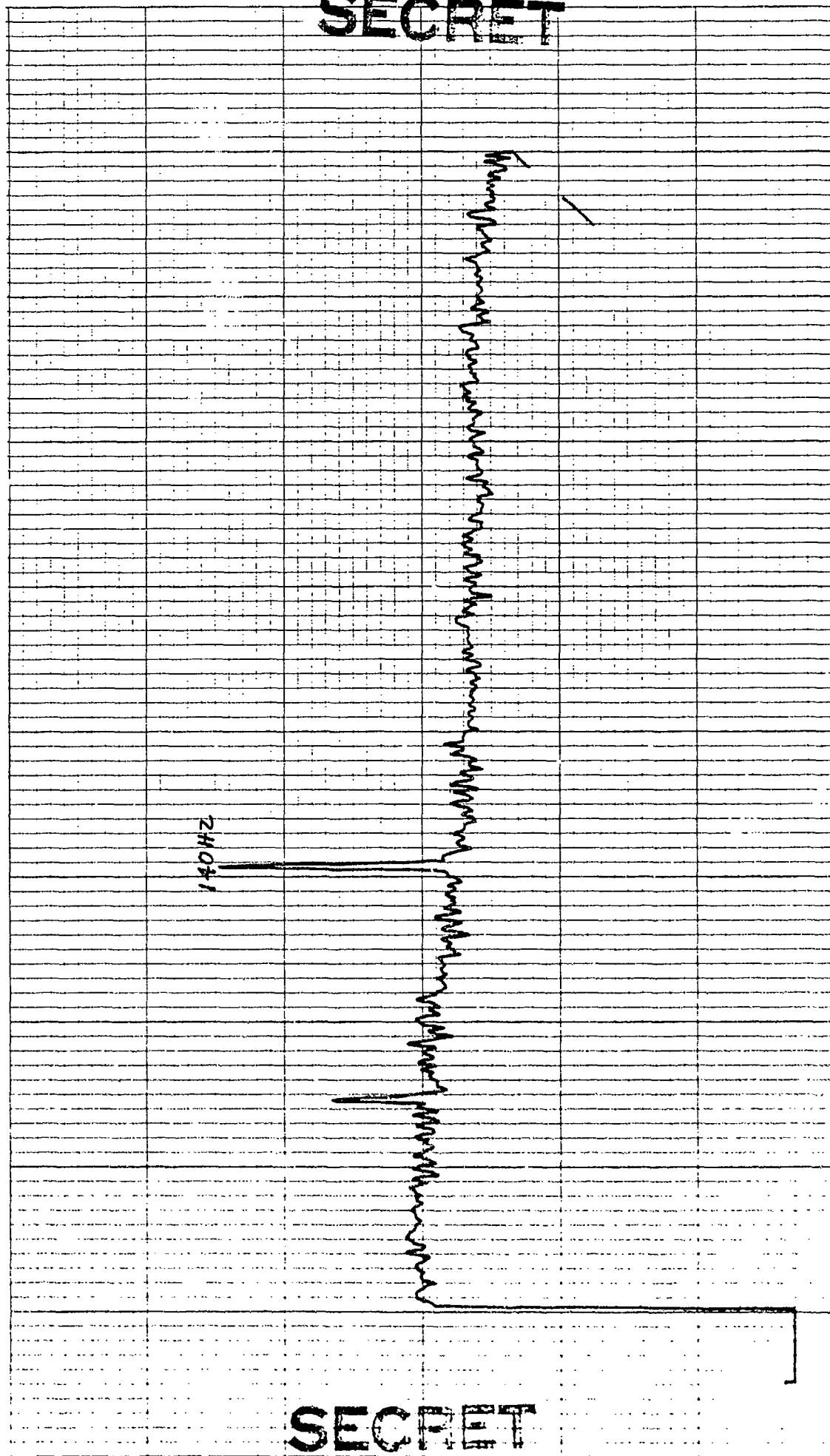
ANALYSIS BANDWIDTH: 1/10 HZ
— DEG AZ STEERING

REEL: M22

INDEX 566

INTEGRATION TIME 320 SECS
FILTER

ATTN: DB
WTG: HANNING



SECRET

SECRET

KSE 10 X 10 TO THE INCHES
KREUTEL AYSSER CO. MADE IN U.S.A.

46 0703

CONTROL: 3-16-0935 (12)
OMNI SPECTRUM (ELEMENT 12)
EXERCISE: BEARING STAKE
CENTER FREQ: 150 HZ
1 ELEMENT

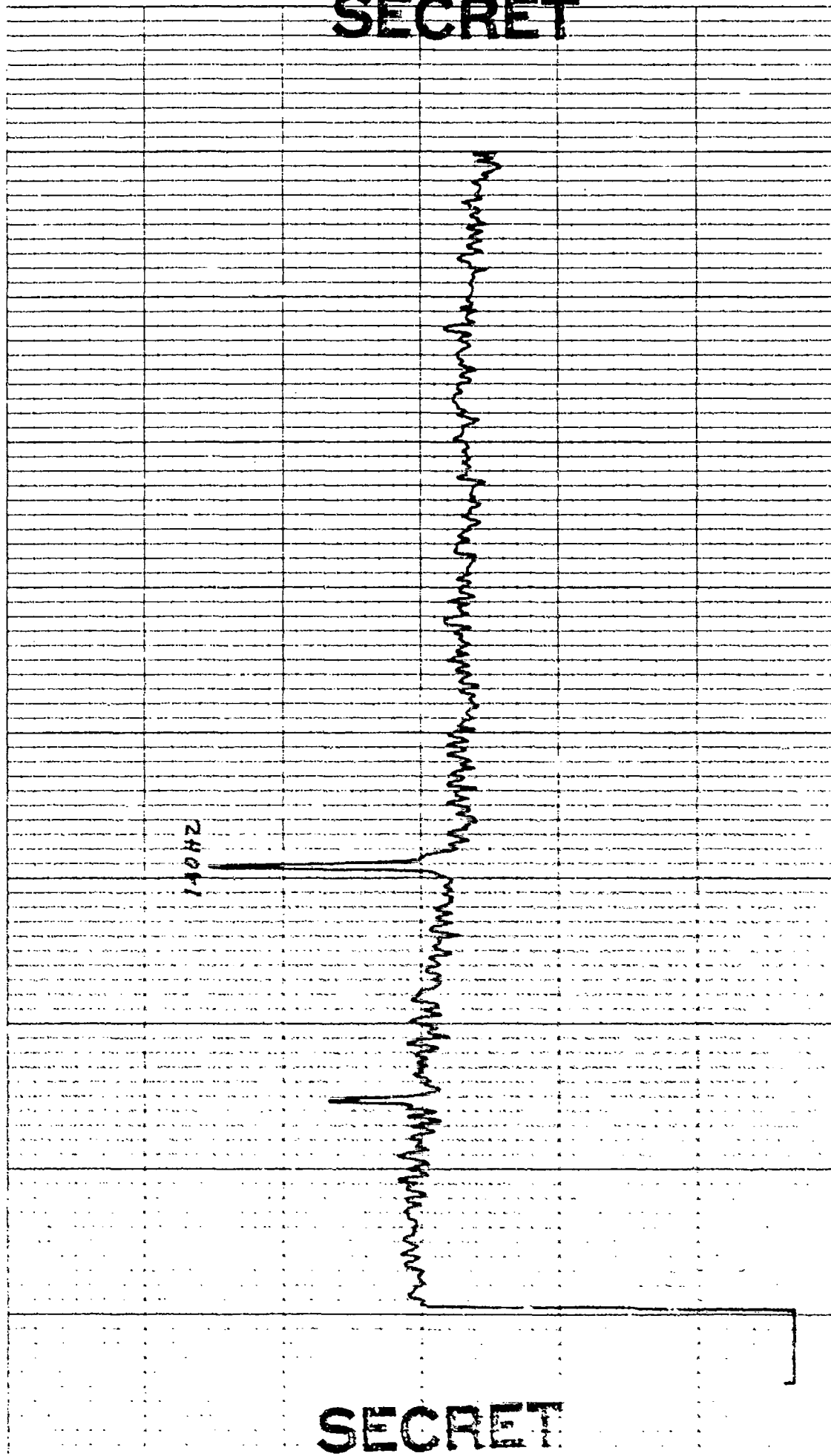
DATE OF ANALYSIS:

DATE/TIME: 3-16-77 -0935 Z
ANALYSIS BANDWIDTH: 1/10 HZ
— DEG AZ STEERING

REEL: M22

INDEX 566

INTEGRATION TIME 320 SECS
FILTER
ATTN: — DB
WTG: HANNING



46 0703

DATE OF ANALYSIS:

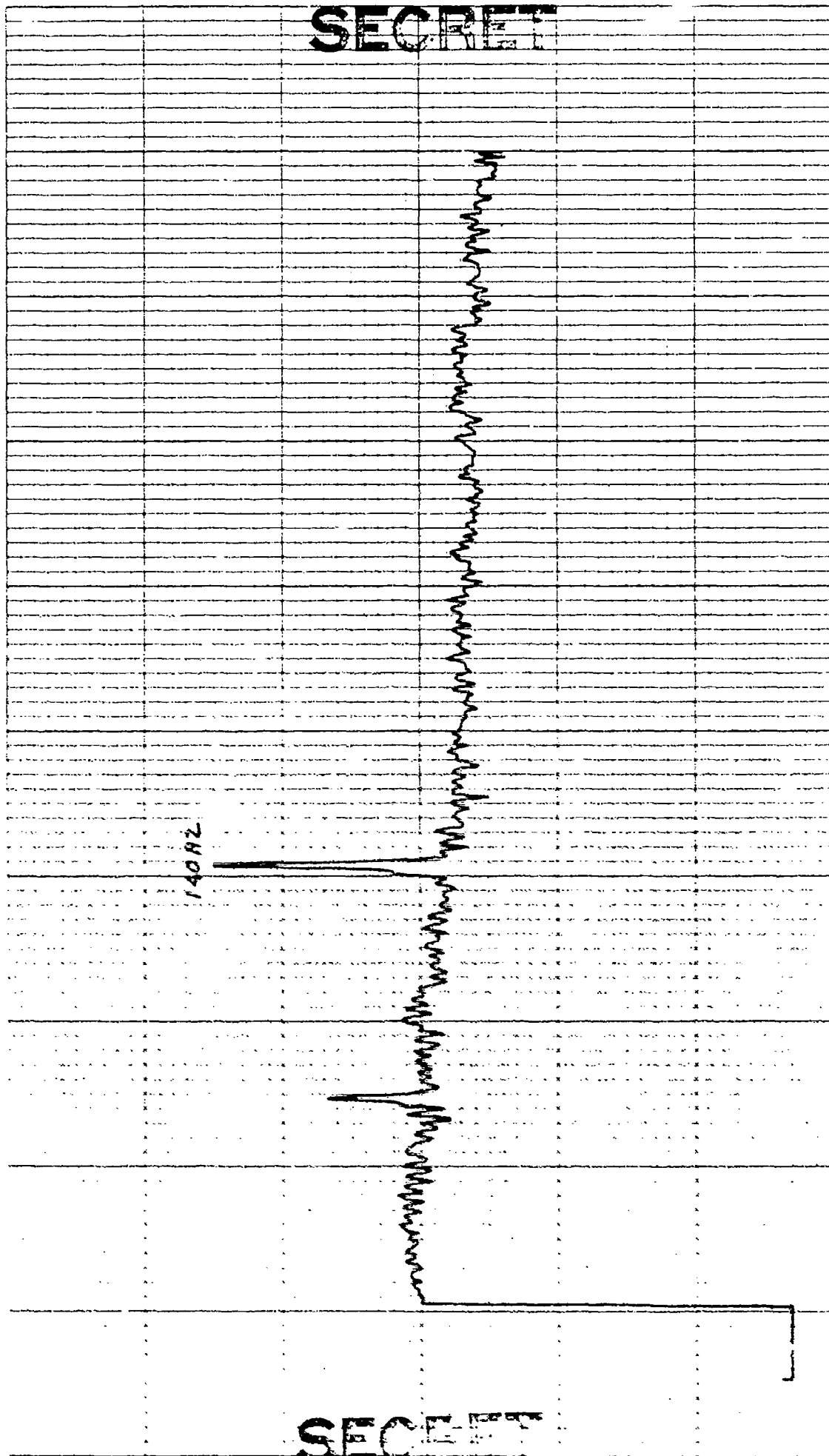
DATE/TIME: 3-16-77 - 0035Z
ANALYSIS BANDWIDTH: 1/10HZ
----- DEG AZ STEERING

REEL: M22 INDEX 566

INTEGRATION TIME 320 SECS ATTN: - DB
FILTER WTC: HANNING

SECRET

SECRET



NOE 10 X 10 TO THE INCHES 4 X 10 1/2 INCHES
RECEIVED AT 11:20 PM 11/11/54

46 0703

CONTROL: 3-16 -0935 (34)
OMNI SPECTRUM(ELEMENT 16)
EXERCISE: BEARING SIAKE
CENTER FREQ: 150 KZ
1 ELEMENT

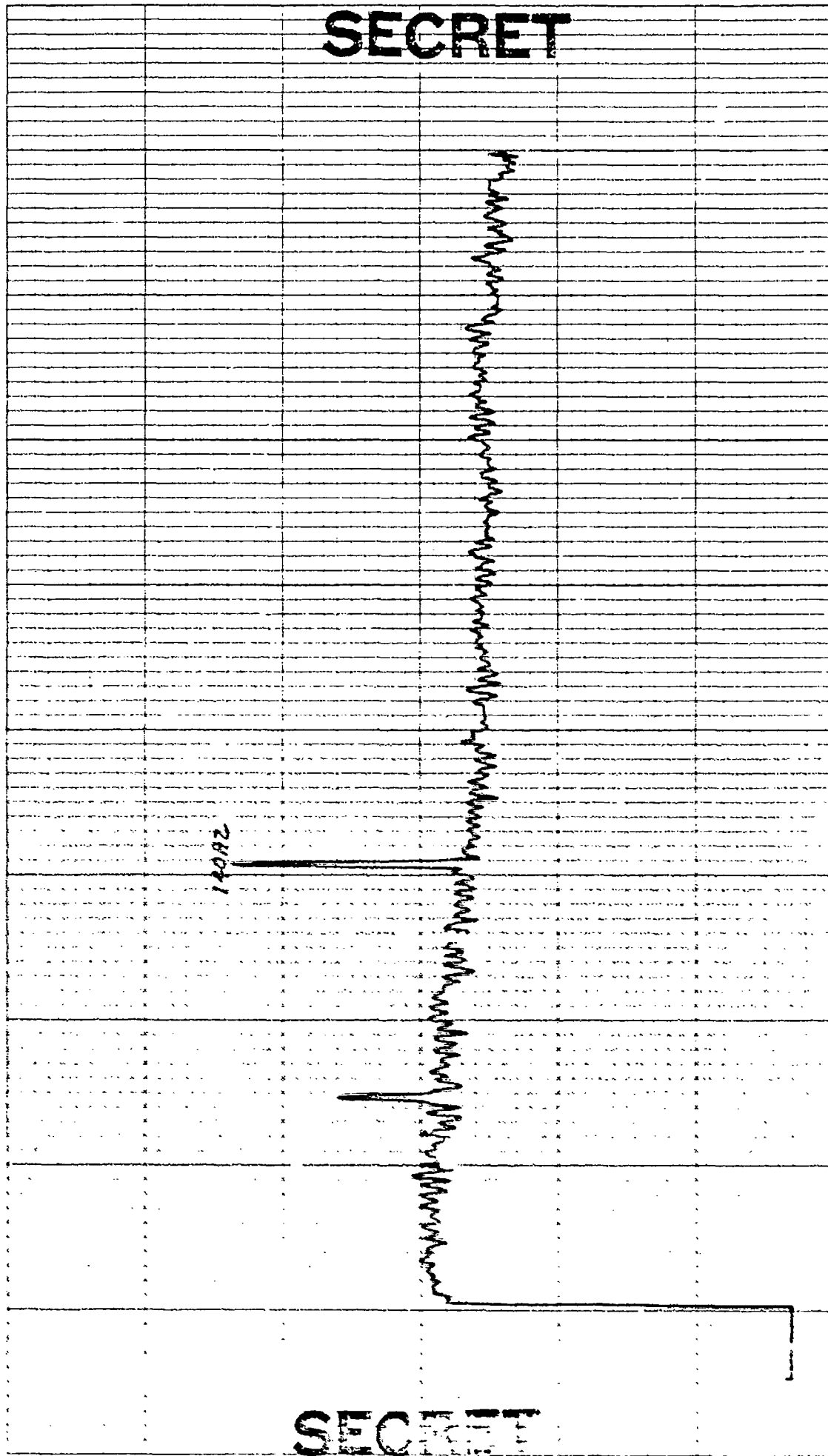
DATE OF ANALYSIS:

DATE/TIME: 3-16-77 -0935 Z
ANALYSIS BANDWIDTH: 1/10HZ
— DEC AZ STEERING

REEL: 422 INDEX 566
INTEGRATION TIME 320 SECS
FILTER WTG: HANNING
ATTN: - DB

SECRET

SECRET

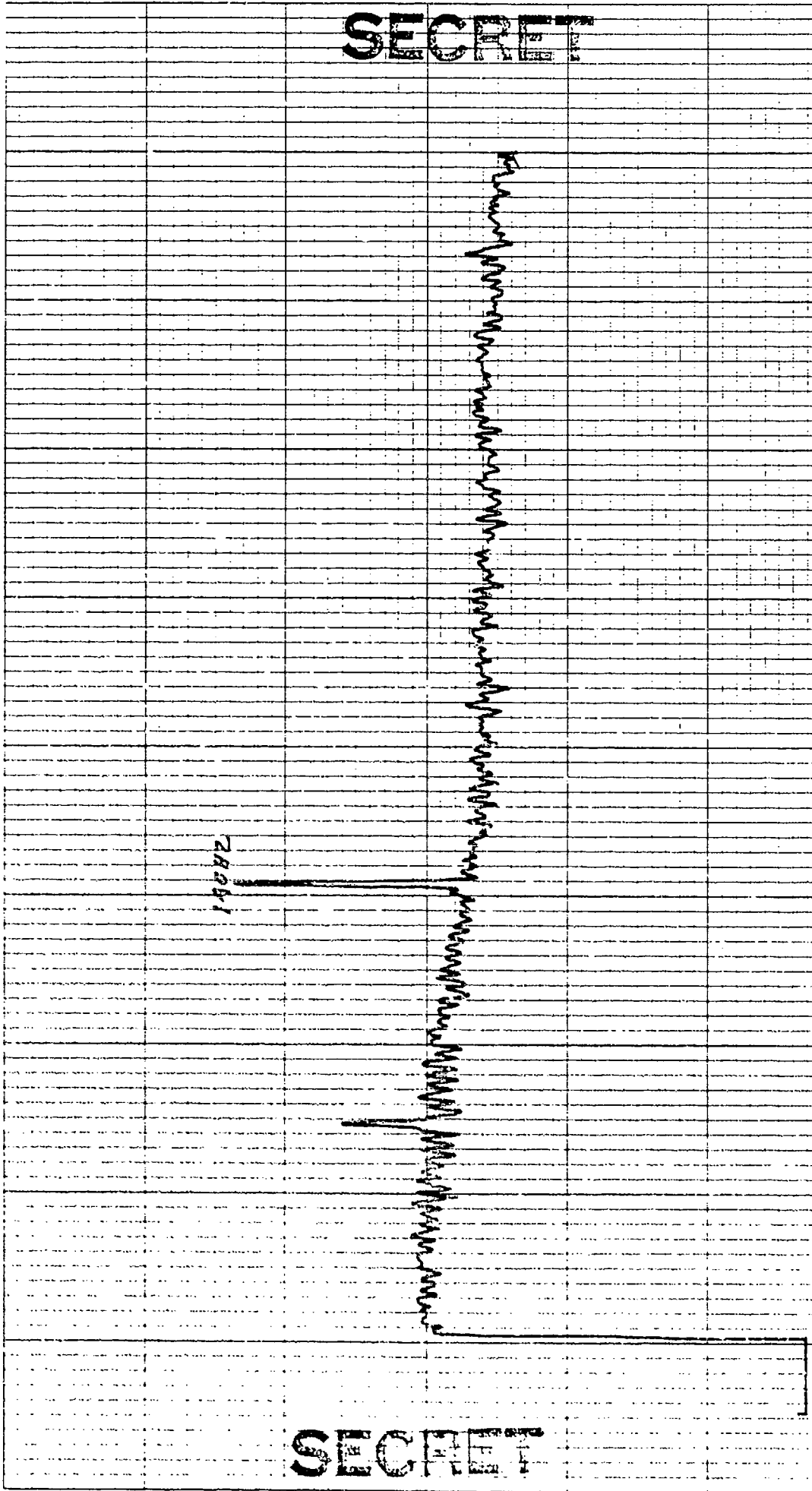


10 X 10 TO THE INCH... K 10 INCHES
KEUFFEL & ESSER CO. MADE IN U.S.A.

46 0703

CONTROL: 3-16-0935 (35) DATE OF ANALYSIS: REEL: M22 INDEX 566
OMNI SPECTRUM (ELEMENT 19)
EXERCISE: BEARING STAKE
CENTER FREQ: 150 HZ INTEGRATION TIME 320 SECS ATTN: — DB
1 ELEMENT FILTER WTG: HANNING

DATE/TIME: 2-16-77-0935 Z
ANALYSIS BANDWIDTH: 1/10 HZ
— DEG A2 STEERING



K-E 10 X 10 TO THE INCH • 7 X 10 INCHES
KEUFFEL & ESSER CO. MADE IN U.S.A.

46 0703

CONTROL: 3-16-0935 (36)
OMNI SPECTRUM (ELEMENT 20)
EXERCISE: BEARING STAKE
CENTER FREQ: 150 HZ
1 ELEMENT

DATE OF ANALYSIS:

DATE/TIME: 3-16-77 -0935 Z

ANALYSIS BANDWIDTH: 1/10 HZ

— DEG AZ STEERING

REEL: M22

INDEX 566

INTEGRATION TIME 320 SECS

FILTER

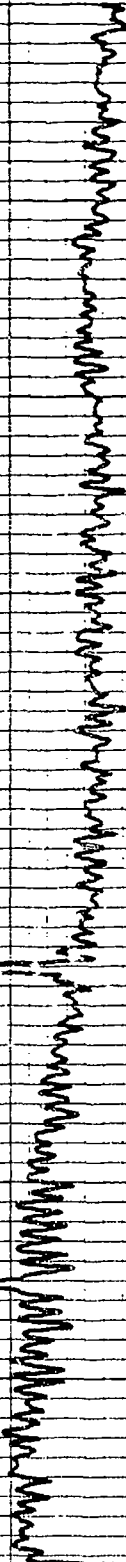
ATTN: — DB

WTG: HANNING

SECRET

SECRET

140 HZ



K-2 10 X 10 TO THE INCH • 7 X 10 INCHES
KEUFFEL & ESSER CO. MADE IN U.S.A.

46 C703

CONTROL: 376-0935 (37)
OMNI SPECTRUM (ELEMENT 23)
EXERCISE: BEARING STAKE
CENTER FREQ: 150 HZ
1 ELEMENT

DATE OF ANALYSIS:

DATE/TIME: 376-77-0935 Z

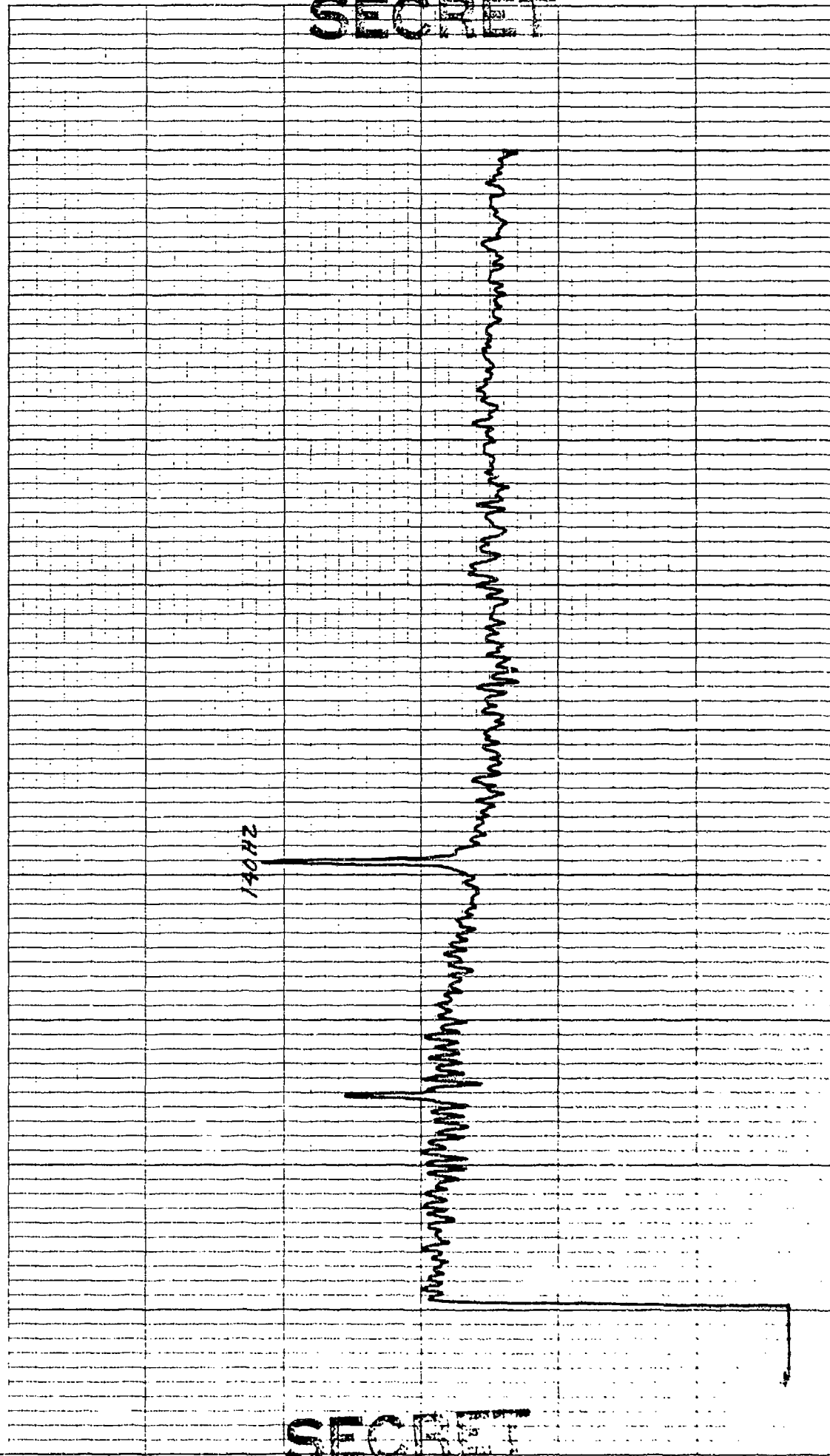
ANALYSIS BANDWIDTH: 1/10 HZ
— DEG AZ STEERING

REEL: H22

INDEX 566

INTEGRATION TIME 320 SECS
FILTER WTG: HANNING

ATTEN: — DB



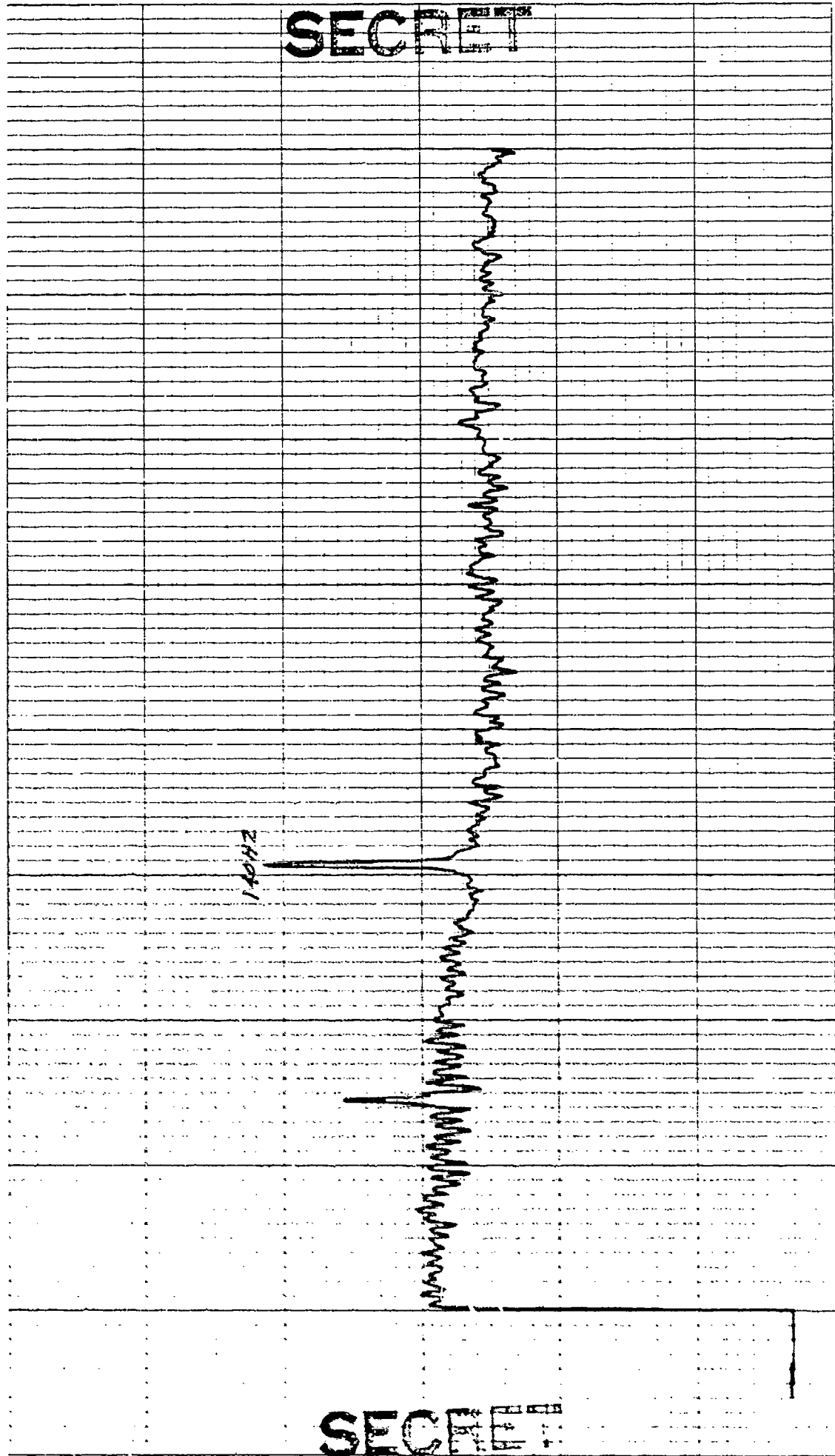
46 0703

REEL: 1122 INDEX: 566

INTEGRATION TIME 320 SECS ATTN: - DB
FILTER WTC: HANNING

DATE OF ANALYSIS:

DATE/TIME: 3-16-77 - 0935Z
ANALYSIS BANDWIDTH: 1/10HZ
-- DEG AZ STEERING



KOE 10 X 10 TO THE INCH • 7 X 10 INCHES
KEUFFEL & ESSER CO. MADE IN U.S.A.

46 0703

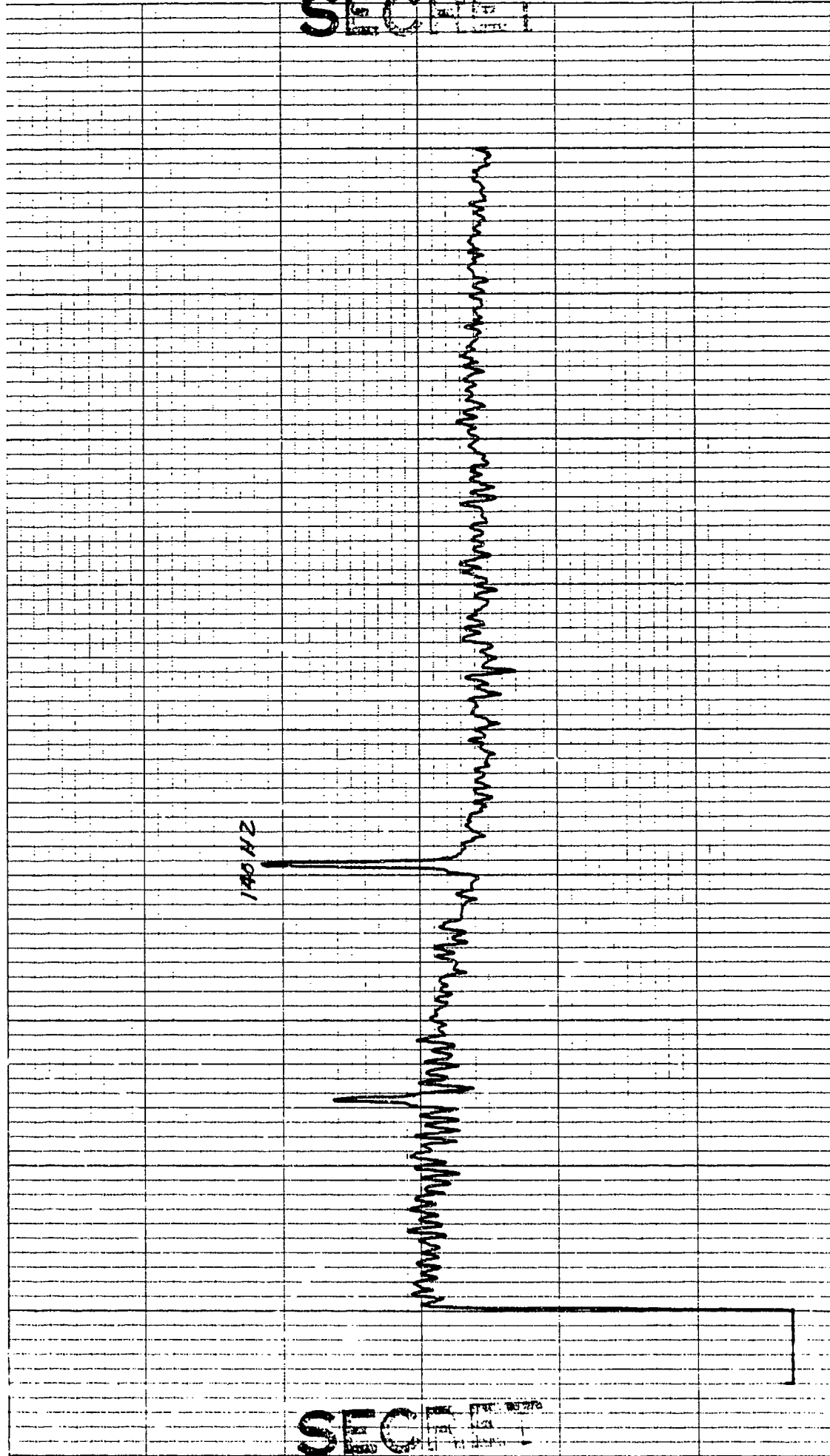
CONTROL: 3-16-0935 (39)
OMNI SPECTRUM (ELEMENT 26)
EXERCISE: BEARING STAKE
CENTER FREQ: 150 HZ
1 ELEMENT

DATE OF ANALYSIS:

DATE/TIME: 3-16-77 - 0335Z
ANALYSIS BANDWIDTH: 1/10HZ
— DEC AZ STEERING

REEL: M22 INDEX 566

INTEGRATION TIME 320 SECS
FILTER
ATTN: — DB
WTG: HANNING



K-2 10 X 10 TO THE INCH • 7 X 10 INCHES
KEUFFEL & ESSER CO. MADE IN U.S.A.

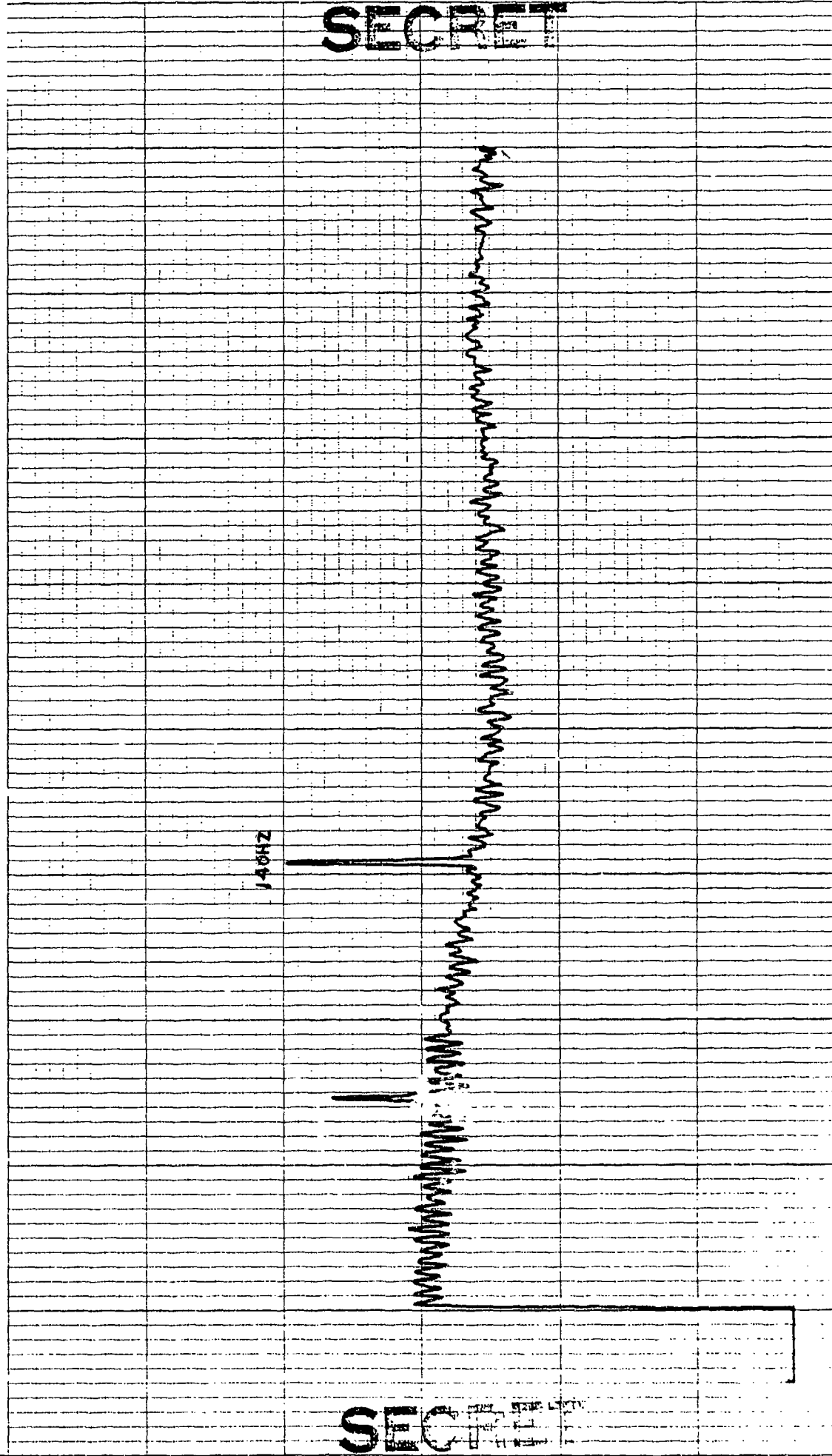
46 0703

CONTROL: 0935 - 51 (DPH)
OMNI SPECTRUM (ELEMENT 29)
EXERCISE: BEARING STAKE
CENTER FREQ: 150 HZ
1 ELEMENT

DATE OF ANALYSIS:

DATE/TIME: 3-16-77 - 0935 Z
ANALYSIS BANDWIDTH: 1/10 HZ
— DEG AZ STEERING

REEL: 1122 INDEX 566
INTEGRATION TIME 320 SECS
ATTN: - DB
FILTER WTG: HANNING



10 X 10 TO THE INCH • 7 X 10 INCHES
KEUFFEL & ESSER CO. MADE IN U.S.A.

46 0703

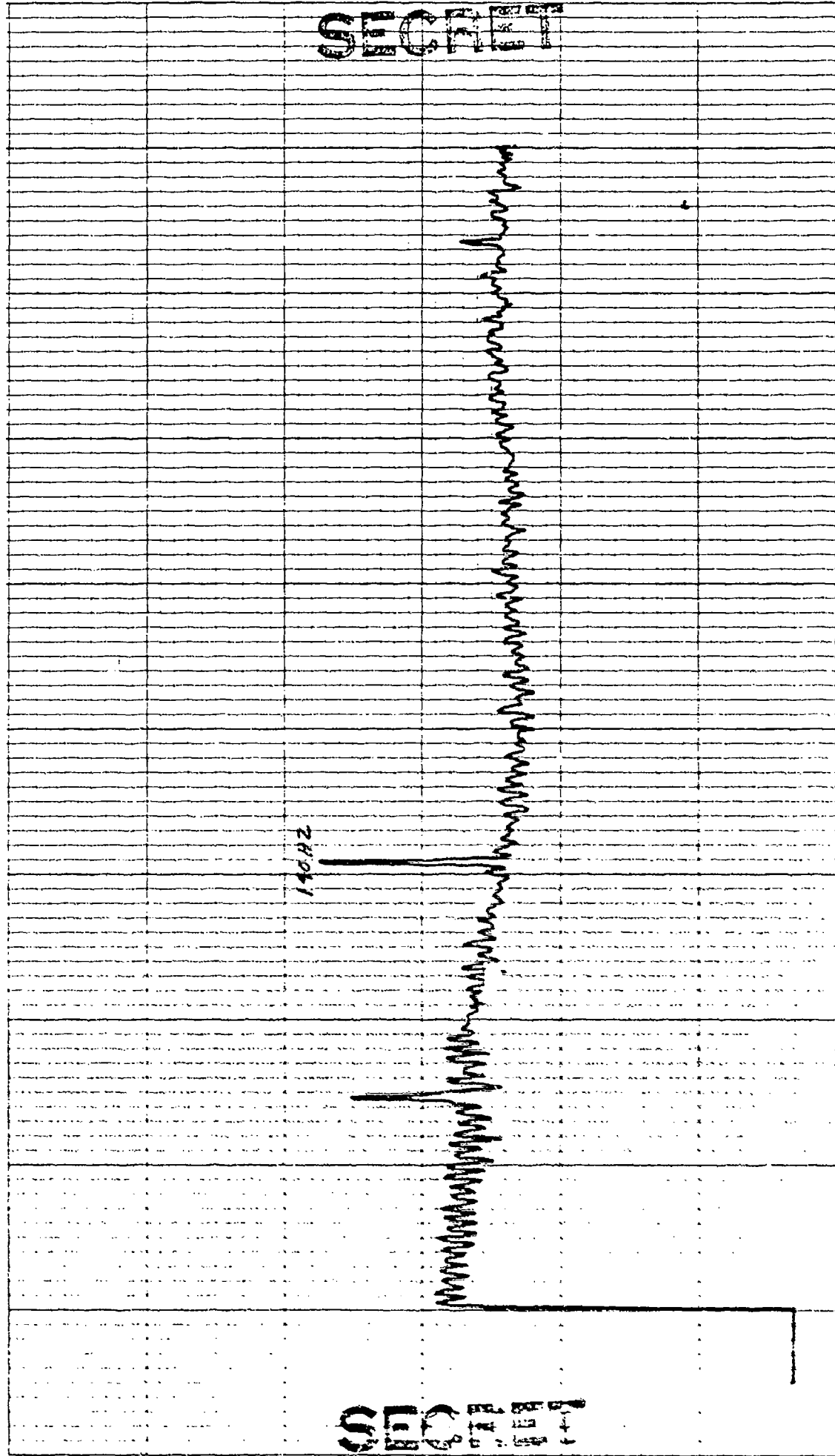
CONTROL: 3-16 - 0935 (41)
OMNI SPECTRUM (ELEMENT 31)
EXERCISE: BEARING STAKE
CENTER FREQ: 150 HZ
1 ELEMENT

DATE OF ANALYSIS:

DATE/TIME: 3-16-77 - 0935 Z
ANALYSIS BANDWIDTH: 1/10 HZ
— DEG AZ STEERING

REEL: M22 INDEX 566

INTEGRATION TIME 320 SECS ATTN: — DB
FILTER WTG: HANNING



46 0703

REF 10 X 10 TO 100 X 100
100 X 100 TO 1000 X 1000

CONTROL: 3-16 - 0935 (42)

OMNI SPECTRUM (ELEMENT 33)

EXERCISE: BEARING STAKE

CENTER FREQ: 150 HZ

1 ELEMENT

DATE OF ANALYSIS:

DATE/TIME: 3-16-77 - 0935 Z

ANALYSIS BANDWIDTH: 1/10 HZ

DEC AZ STEERING

REEL: 1122

INDEX 566

INTEGRATION TIME 320 SECS

FILTER

ATTEN: — DB

WTG: HANNING

SECRET

SECRET

150 HZ

KOE 10 X 10 TO THE INCH • 1 X 10 INCHES
KEUFFEL & ESSER CO. MADE IN U.S.A.

46 0703

CONTROL: 376 - 0935 (43)
OMNI SPECTRUM (ELEMENT 35)
EXERCISE: BEARING STAKE
CENTER FREQ: 150 HZ
1 ELEMENT

DATE OF ANALYSIS:

DATE/TIME: 3-16-77 - 0935Z

ANALYSIS BANDWIDTH: 1/10 HZ
— — — DEG AZ STEERING

REEL: M22

INDEX 566

INTEGRATION TIME 320 SECS
FILTER
ATTN: — DB
WTG: HANNING

140 HZ

SECRET

10 X 10 TO THE INCH • 7 X 10 INCHES
KEUFFEL & ESSER CO. MADE IN U.S.A.

46 0703

CONTROL: 376-0935 (44)
OMNI SPECTRUM (ELEMENT 37)
EXERCISE: BEARING STAKE
CENTER FREQ: 150 HZ
1 ELEMENT

DATE OF ANALYSIS:

DATE/TIME: 3-16-77-0935 Z
ANALYSIS BANDWIDTH: 1/10 HZ
— DEG AZ STEERING

REEL: M22

INDEX: 566

INTEGRATION TIME 320 SECS
ATTEN: - DB
WTG: HANNING
FILTER

140 HZ

SECRET

46 0703

DATE OF ANALYSIS:

DATE/TIME: 3-6-77-0935Z
ANALYSIS BANDWIDTH: 1/10HZ
DEG AZ STEERING

REEL: M19

INTEGRATION TIME 320 SECS ATTN: — DB
 FILTER WTC: HANNING

1042

S

K.E. 10-10-77 1448 (800 314-1) 4-10-77 1448
RECEIVED 10-10-77 1448

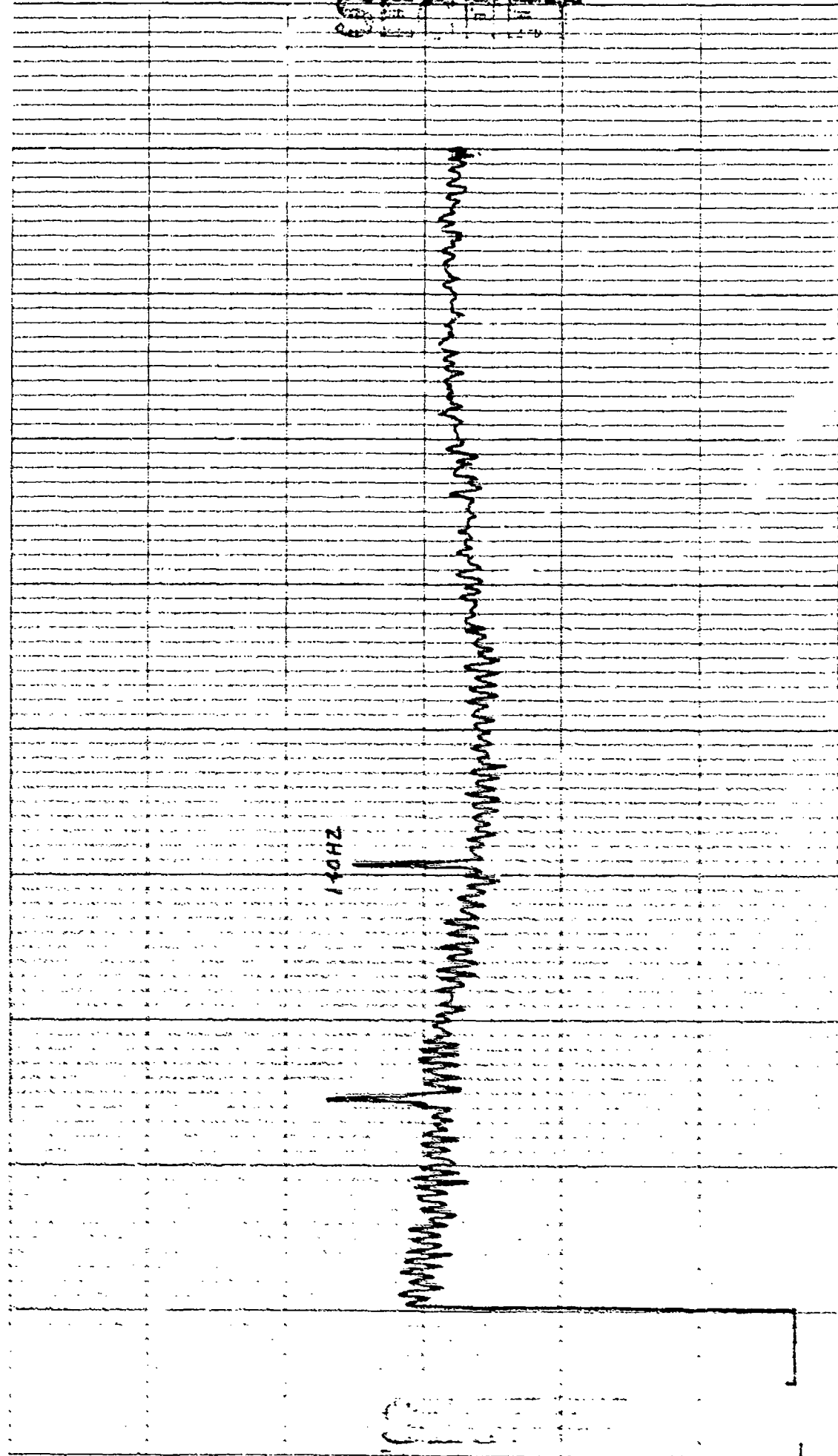
46 0703

CONTROL: 3-16-0935 (46)
OMNI SPECTRUM (ELEMENT 41)
EXERCISE: BEARING STAKE
CENTER FREQ: 150 HZ
1 ELEMENT

DATE OF ANALYSIS:
DATE/TIME: 3-16-77-0935Z
ANALYSIS BANDWIDTH: 1/10HZ
DEG AZ STEERING

REEL: 122 INDEX: 566

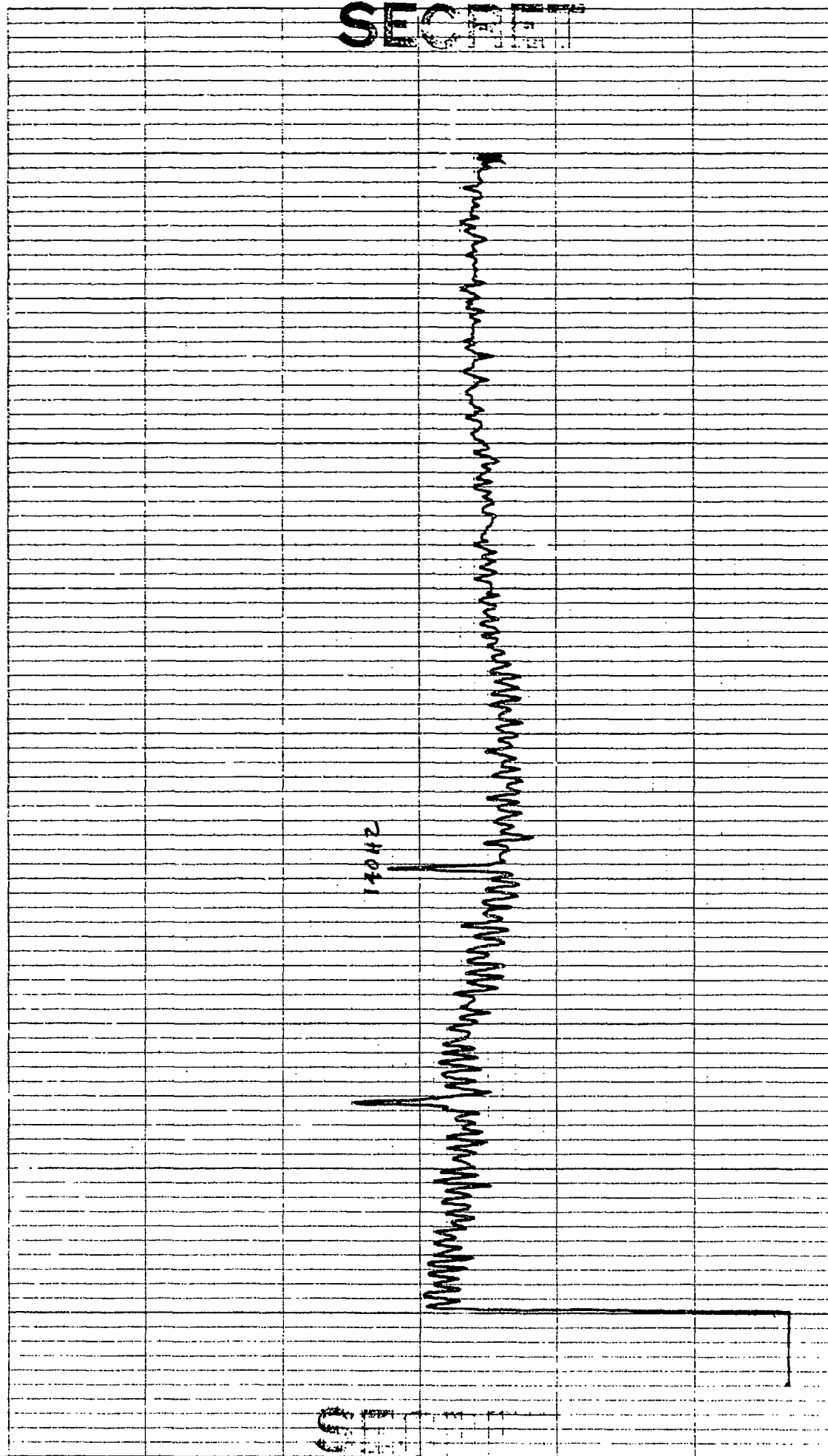
INTEGRATION TIME 320 SECS
ATTEN: - DB
FILTER WTC: HANNING



46 0703

10 X 11 CO THE INCH 7 X 10 INCHES
HEIDEL A. ESSER CO. MADE IN U.S.A.

CONTROL: 3-16-0935 (47) DATE OF ANALYSIS: REEL: M22 INDEX 566
OMNI SPECTRUM (ELEMENT 43)
EXERCISE: BEARING STAKE
CENTER FREQ: 150 HZ
1 ELEMENT
DATE/TIME: 3-16-77 - 0935 Z
ANALYSIS BANDWIDTH: 1/10 HZ
INTEGRATION TIME 320 SECS
ATTN: - DB
FILTER WTG: HANNING



SECRET

K-2 10 X 10 TO THE INCH • 7 X 10 INCHES
KEUFFEL & ESSER CO. MADE IN U.S.A.

46 0703

CONTROL: 3-16-0935 (48)
OMNI SPECTRUM (ELEMENT 45)
EXERCISE: BEARING STAKE
CENTER FREQ: 150 HZ
1 ELEMENT

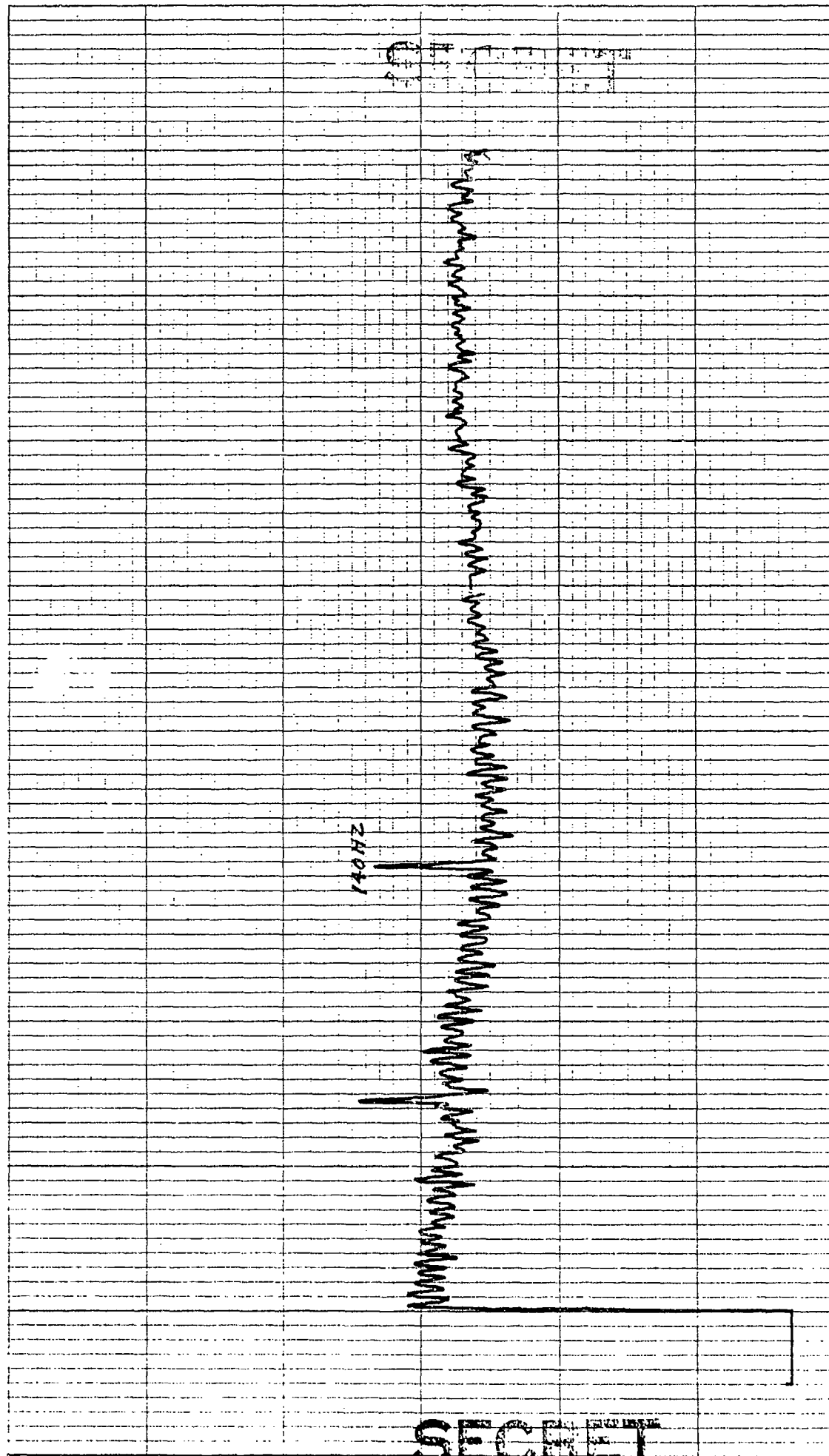
DATE OF ANALYSIS:

DATE/TIME: 3-16-77 - 0935 Z
ANALYSIS BANDWIDTH: 1/10 HZ
1 DEG AZ STEERING

REEL: M22

INDEX 566

INTEGRATION TIME 320 SECS ATTN: - DB
FILTER WTC: HANNING



K&E 10 X 10 TO THE INCH • 7 X 10 INCHES
KEUFFEL & ESSER CO. MADE IN U.S.A.

46 0703

CONTROL: 3-16-0935 (49)
OMNI SPECTRUM (ELEMENT 47)
EXERCISE: BEARING STAKE
CENTER FREQ: 150 HZ
1 ELEMENT

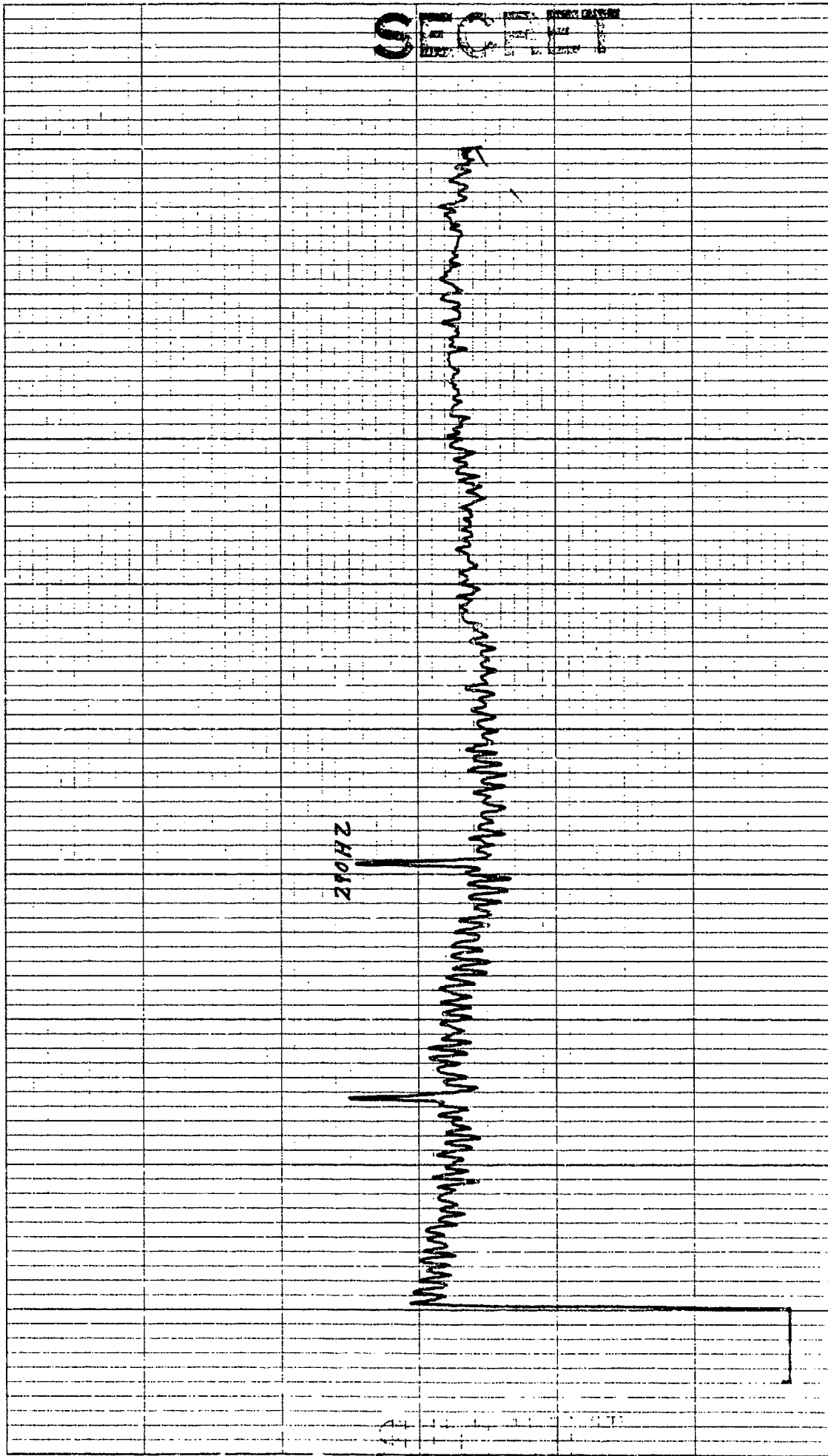
DATE OF ANALYSIS:

DATE/TIME: 3-16-77 -0935 Z
ANALYSIS BANDWIDTH: 1/10 HZ
DEC AZ STEERING

REEL: 422

INDEX 566

INTEGRATION TIME 320 SECS
FILTER
ATTN: - DB
WTG: HANNING



SECRET

K&E 10 X 10 TO THE INCH • 7 X 10 INCHES
KEUFEL & ESSER CO. MADE IN U.S.A.

46 0703

CONTROL: 3-16-0935 (50)
OMNI SPECTRUM (ELEMENT 49)
EXERCISE: BEARING STAKE
CENTER FREQ: 150 HZ
1 ELEMENT

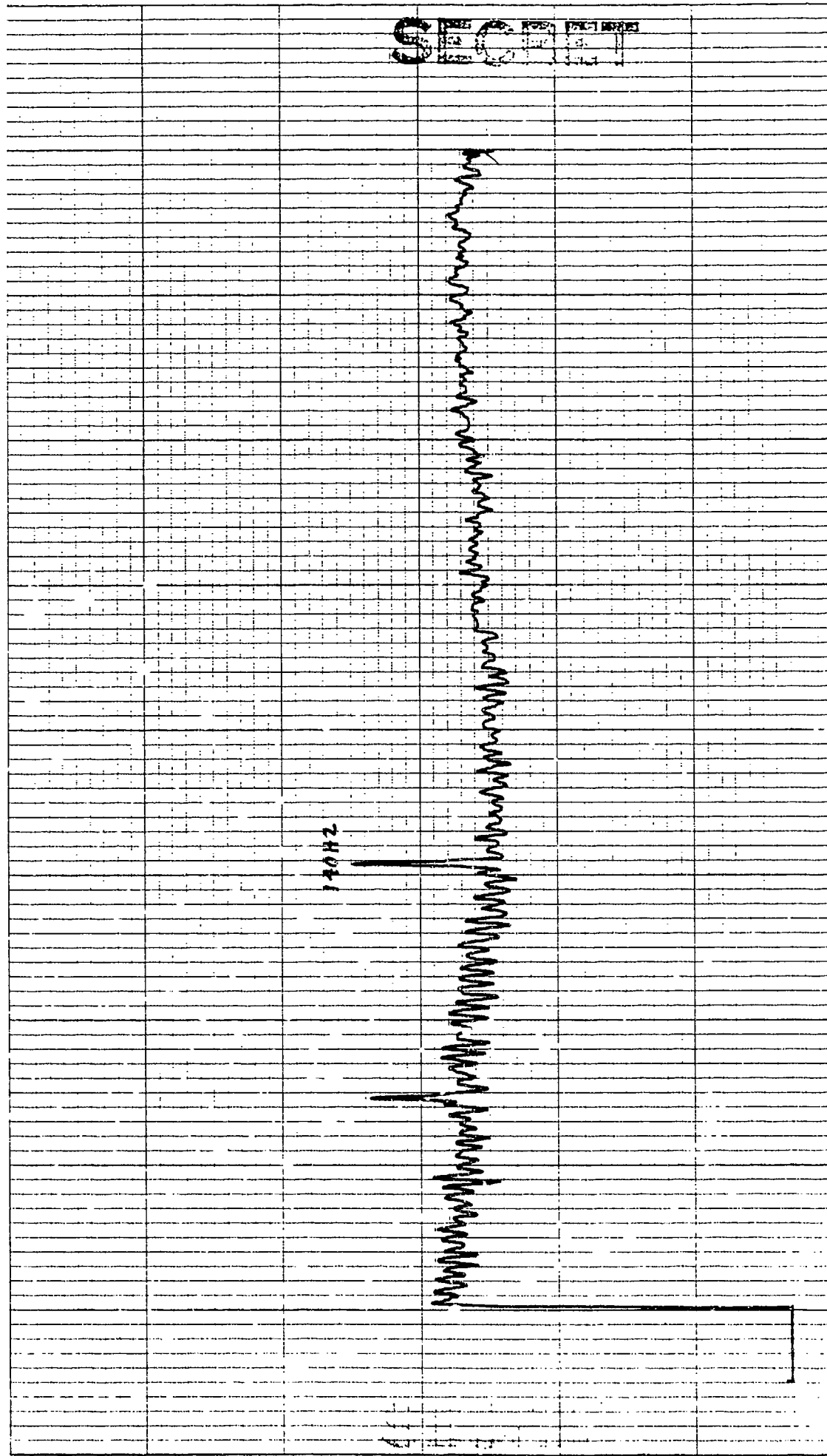
DATE OF ANALYSIS:

DATE/TIME: 3-16-77 - 0935 Z
ANALYSIS BANDWIDTH: 1/10 HZ
— DEC AZ STEERING

REEL: M22

INDEX 566

INTEGRATION TIME 320 SECS ATTN: - DB
FILTER WTG: HANNING



SECRET

K&E 10 X 10 TO THE INCH • 7 X 10 INCHES
KEUFFEL & ESSER CO. MADE IN U.S.A.

46 0703

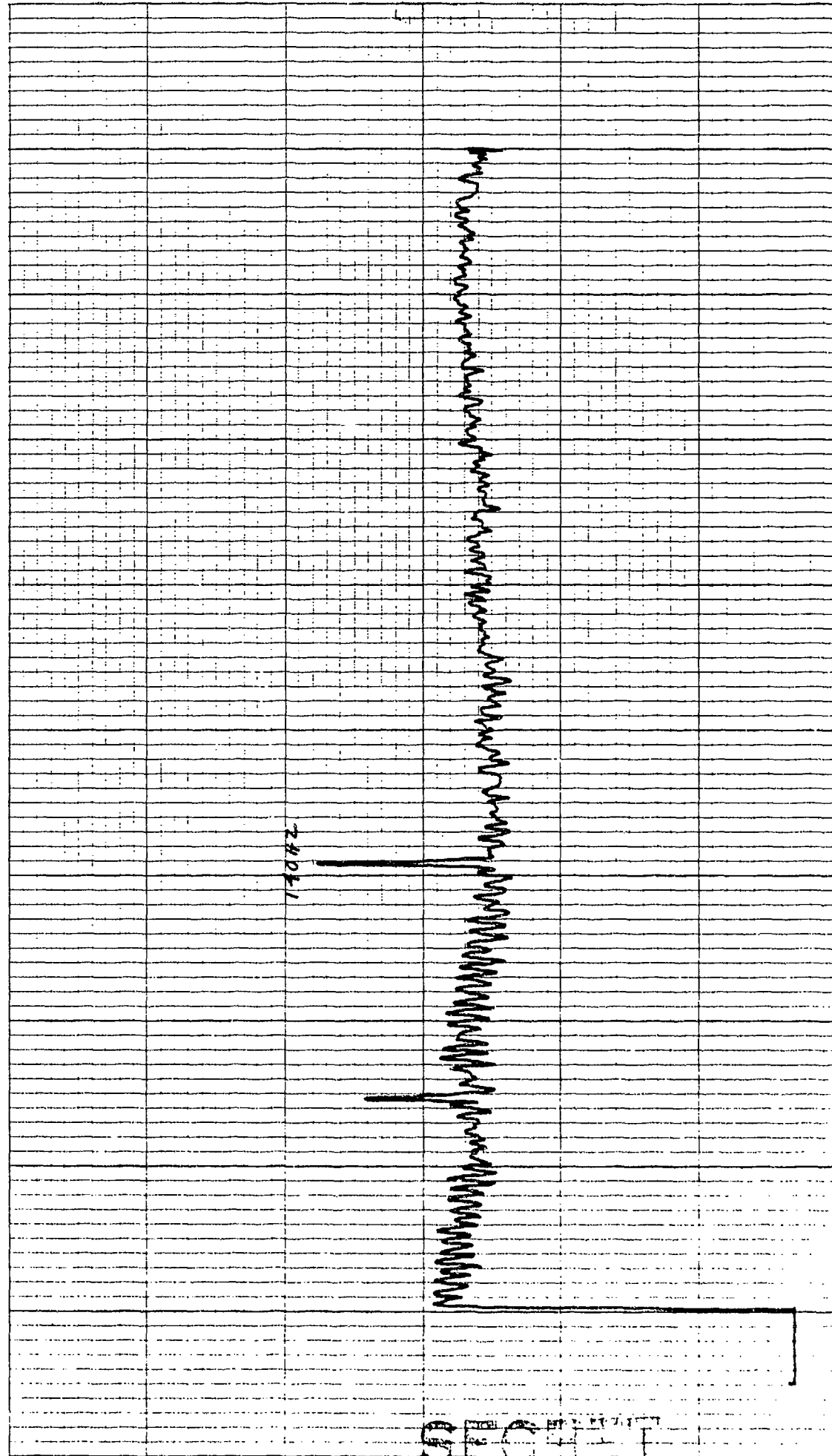
CONTROL: 216-0935 (51)
OMNI SPECTA JM (ELEMENT 51)
EXERCISE: BEARING STAKE
CENTER FREQ: 150 HZ
1 ELEMENT

DATE OF ANALYSIS:

DATE/TIME: 3-1677 -0935 Z
ANALYSIS BANDWIDTH: 1/10 HZ
— DEG AZ STEERING

REEL: 122 INDEX 566

INTEGRATION TIME 320 SECS
ATTEN: - DB
FILTER WTG: HANNING



16 X 10 TO THE INCH • 7 X 10 INCHES
KEUFFEL & ESSER CO. MADE IN U.S.A.

46 0703

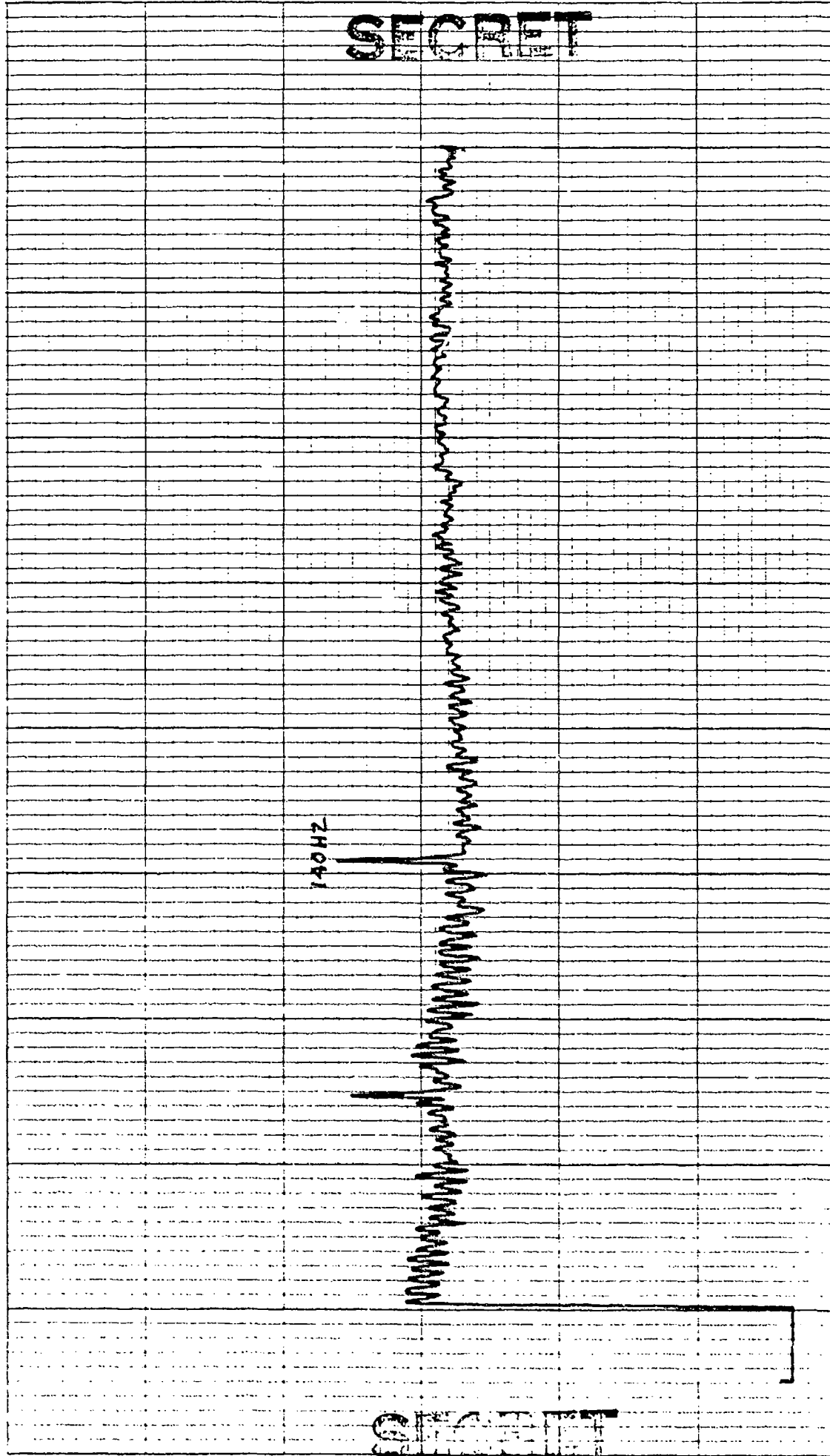
CONTROL: 3-16-0935 (52)
OMNI SPECTRUM (ELEMENT 53)
EXERCISE: BEARING STAKE
CENTER FREQ: 150 HZ
1 ELEMENT

DATE OF ANALYSIS:

DATE/TIME: 3-16-77 - 0935 Z
ANALYSIS BANDWIDTH: 1/10 HZ
— DEG AZ STEERING

REEL: N22 INDEX 566

INTEGRATION TIME 320 SECS ATTN: — DB
FILTER WTG: HANNING



K&E 10 X 10 TO THE INCH • 7 X 10 INCHES
KEUFFEL & ESSER CO. MADE IN U.S.A.

46 0703

CONTROL: 3-16-0835 (53)
OMNI SPECTRUM (ELEMENT 2)
EXERCISE: BEARING STAKE
CENTER FREQ: 280 HZ
1 ELEMENT

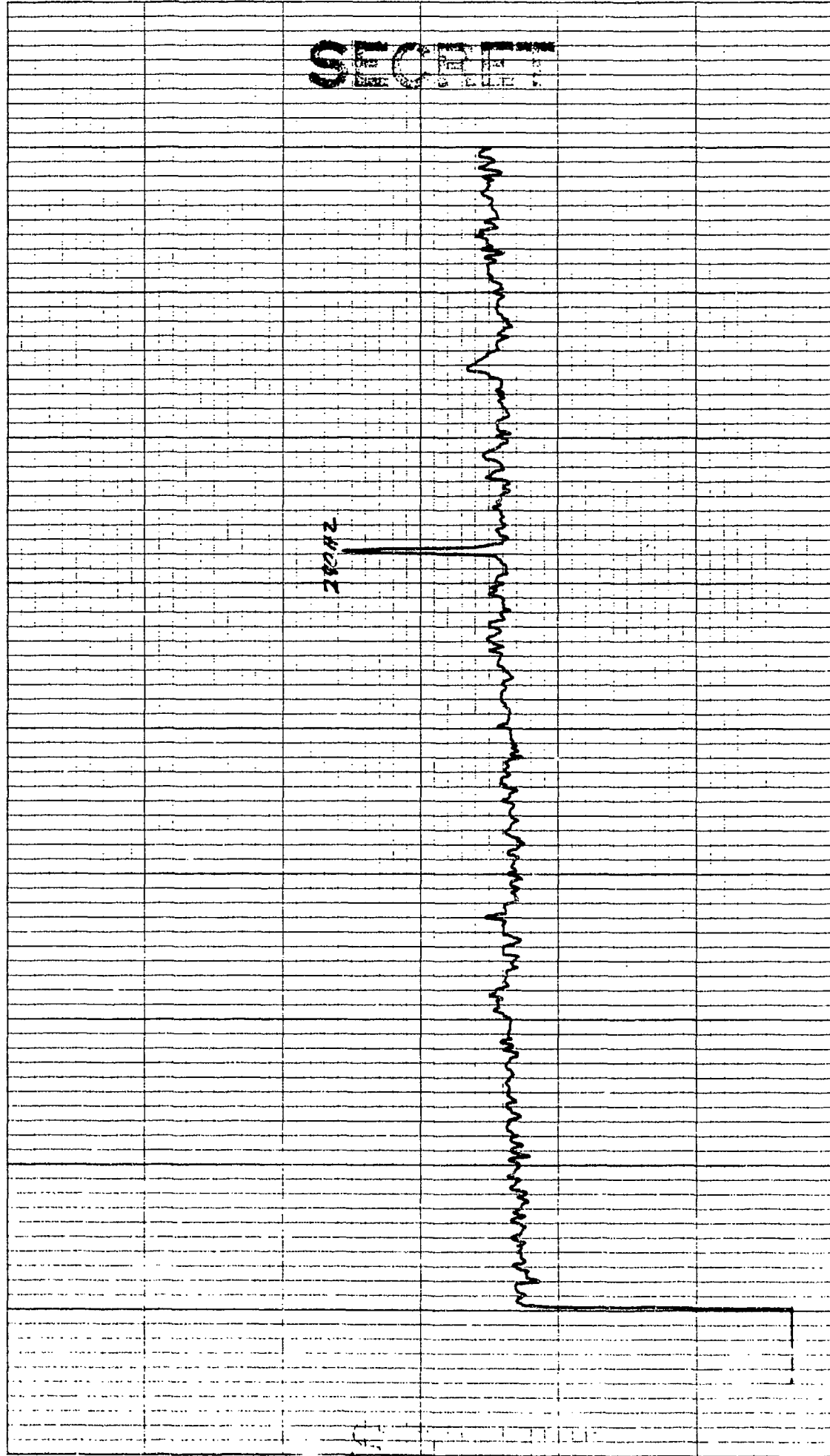
DATE OF ANALYSIS:

DATE/TIME: 3-16-77 - 0835 Z
ANALYSIS BANDWIDTH: 1/10 HZ
— DEG AZ STEERING

REEL: M22

INDEX 566

INTEGRATION TIME 320 SECS
FILTER
ATTN: — DB
WTG: HANNING



K-E 10 X 10 TO THE INCH • 7 X 10 INCHES
KEUFFEL & ESSER CO. MADE IN U.S.A.

46 0703

CONTROL: 3-16 - 0935 (54)
OMNI SPECTRUM (ELEMENT 4)
EXERCISE: BEARING STAKE
CENTER FREQ: 200 HZ
1 ELEMENT

DATE OF ANALYSIS:

DATE/TIME: 3-16-77 - 0935 Z

ANALYSIS BANDWIDTH: 1/10 HZ

— DEG AZ STEERING

REEL: 122

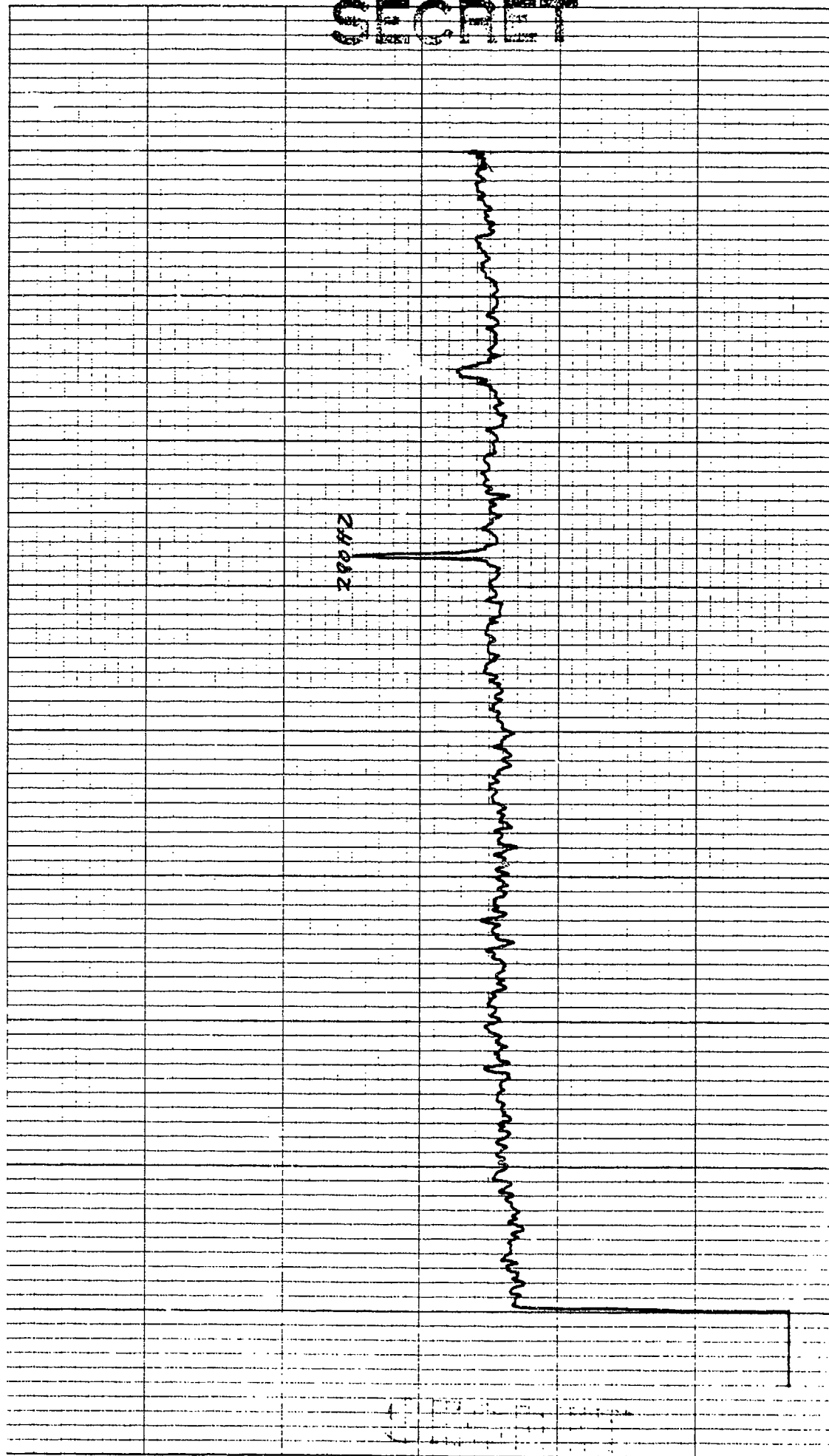
INDEX 56

INTEGRATION TIME 320 SECS

ATTEN: - DB

FILTER

WTG: HANNING



K&E 10 X 10 TO THE INCH • 7 X 10 INCHES
KEUFFEL & ESSER CO. MADE IN U.S.A.

46 0703

CONTROL: 3-16-0935 (55)
OMNI SPECTRUM (ELEMENT 6)
EXERCISE: BEARING STAKE
CENTER FREQ: 200 HZ
1 ELEMENT

DATE OF ANALYSIS:

DATE/TIME: 3-16-77 - 0935 Z

ANALYSIS BANDWIDTH: 1/10 HZ

— DEC AZ STEERING

REEL: 1222

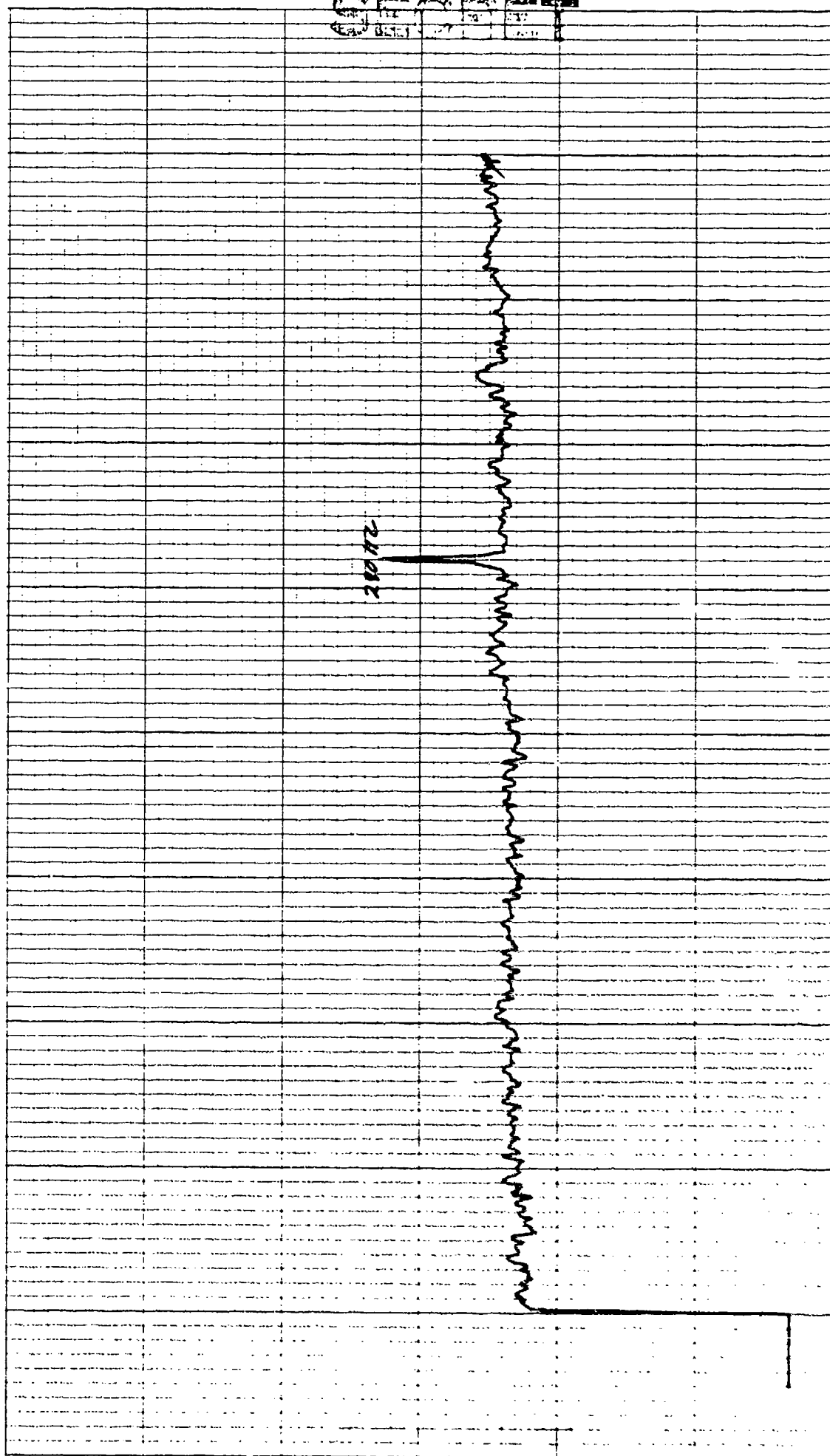
INDEX 566

INTEGRATION TIME 320 SECS

FILTER

ATTN: - DB

WTC: HANNING



SECRET

10. X 10 TO 10 T10 INCHES 7 x 10 HYP HES
REUSEL & EUGEN CO. MADE IN U.S.A.

46 0703

CONTROL: 3-16-0035 (56)
OMNI SPECTRUM (ELEMENT 9)
EXERCISE: BEARING STAKE
CENTER FREQ: 280 HZ
1 ELEMENT

DATE OF ANALYSIS:

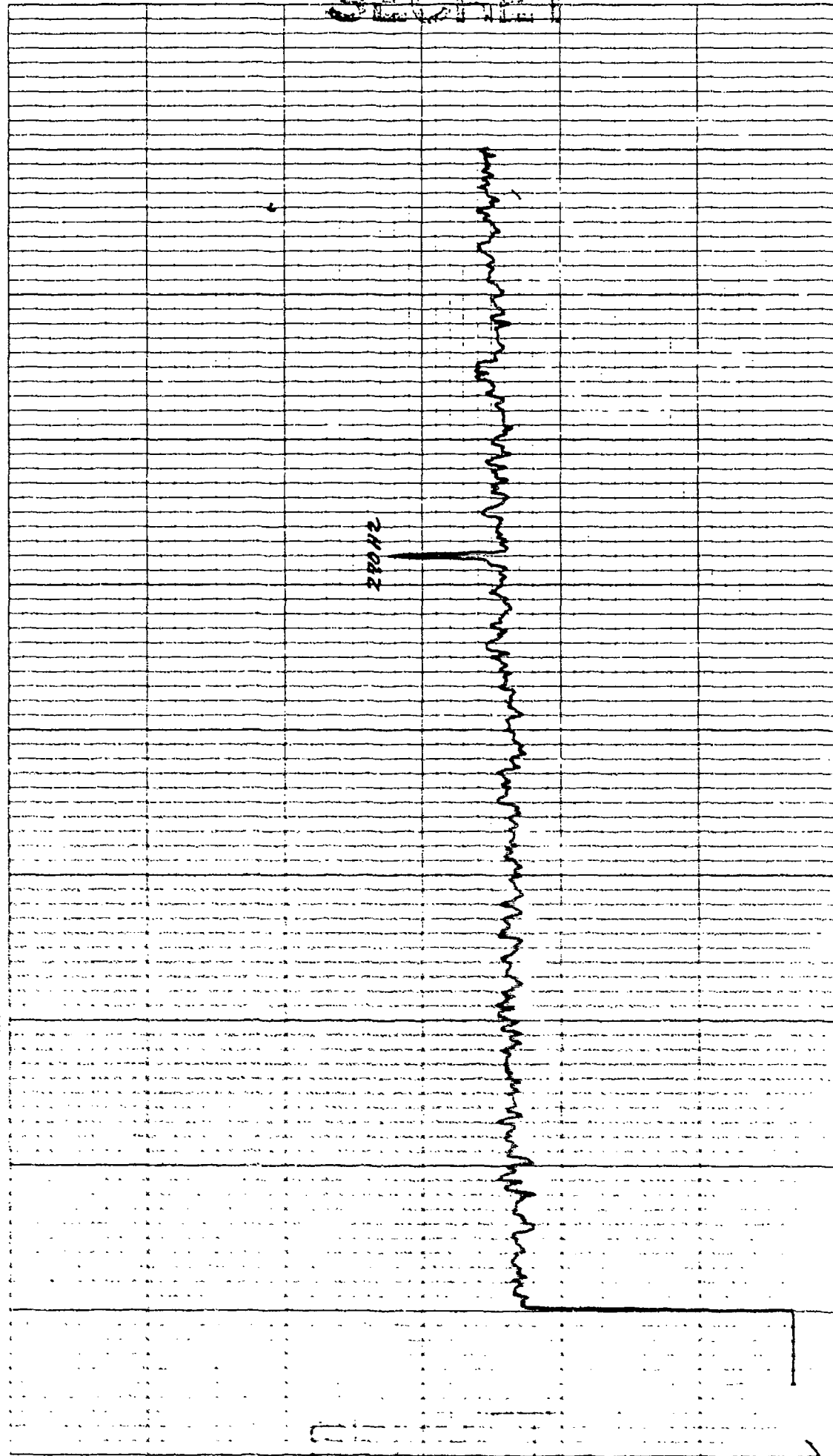
DATE/TIME: 3-16-77 - 0035 Z

ANALYSIS BANDWIDTH: 1/10 HZ
— DEG AZ STEERING

REEL: 122

INDEX 566

INTEGRATION TIME 320 SECS
ATTN: DB
FILTER WTC: HANNING



SECRET

KOE 10 X 10 TO THE INCH • X 10 INCHES
KEUFEL & ESSER CO. MADE IN U.S.A.

46 0703

CONTROL: 3-16 - 0935 (57)
OMNI SPECTRUM (ELEMENT 10)
EXERCISE: BEARING STAKE
CENTER FREQ: 280 HZ
1 ELEMENT

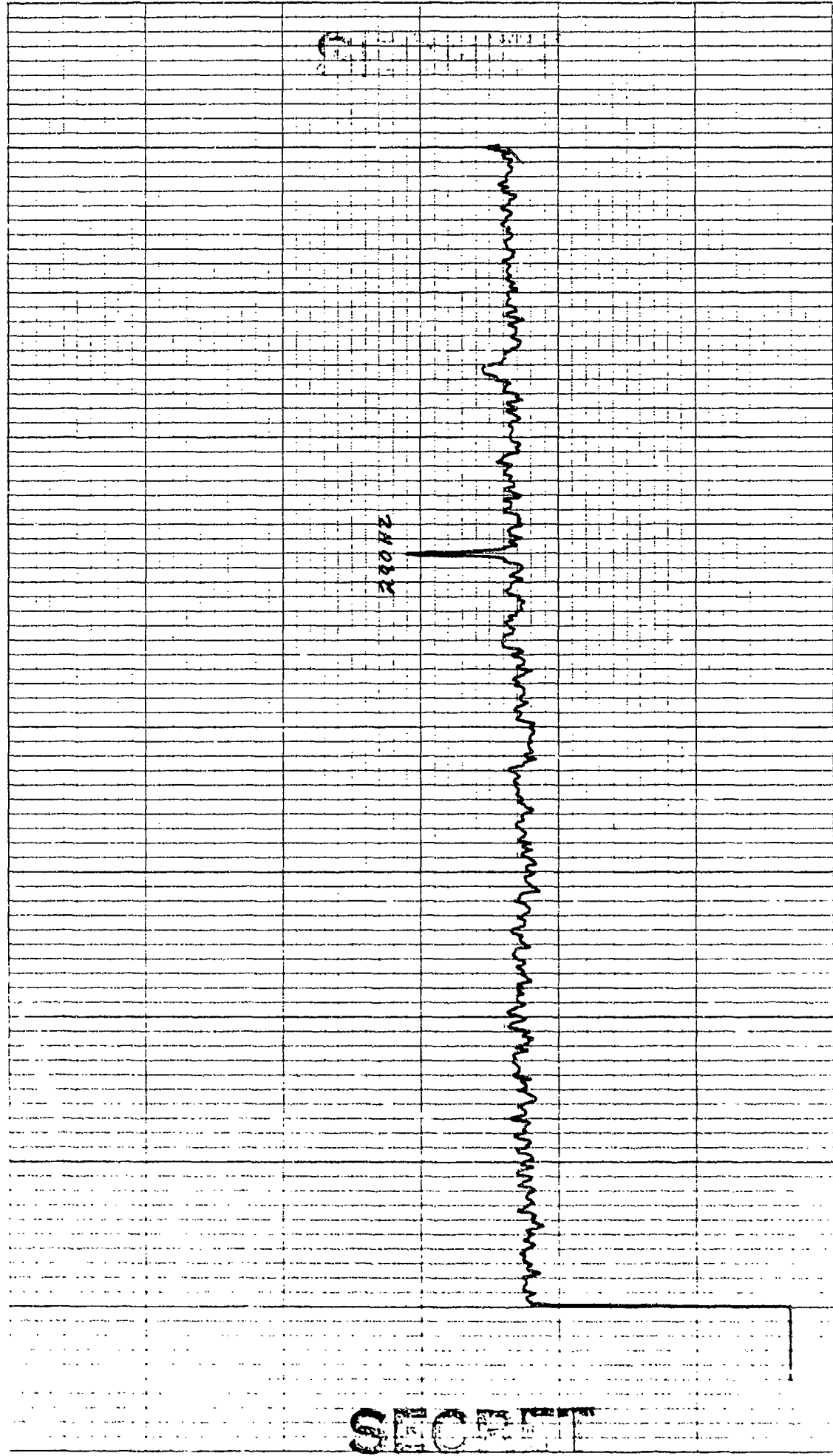
DATE OF ANALYSIS:

DATE/TIME: 3-6-77 - 0935 Z
ANALYSIS BANDWIDTH: 1/10 HZ
— DEG AZ STEERING

REEL: M22

INDEX 666

INTEGRATION TIME 320 SECS
FILTER WTG. HANNING



SECRET

140E 10 X 10 TO THE INCH. 7 X 10 INCHES
KEUFFEL & ESSNER CO. MADE IN U.S.A.

46 0703

CONTROL: 3-6 -0835 (58)
OMNI SPECTRUM (ELEMENT 12)
EXERCISE: BEARING STAKE
CENTER FREQ: 280 HZ
1 ELEMENT

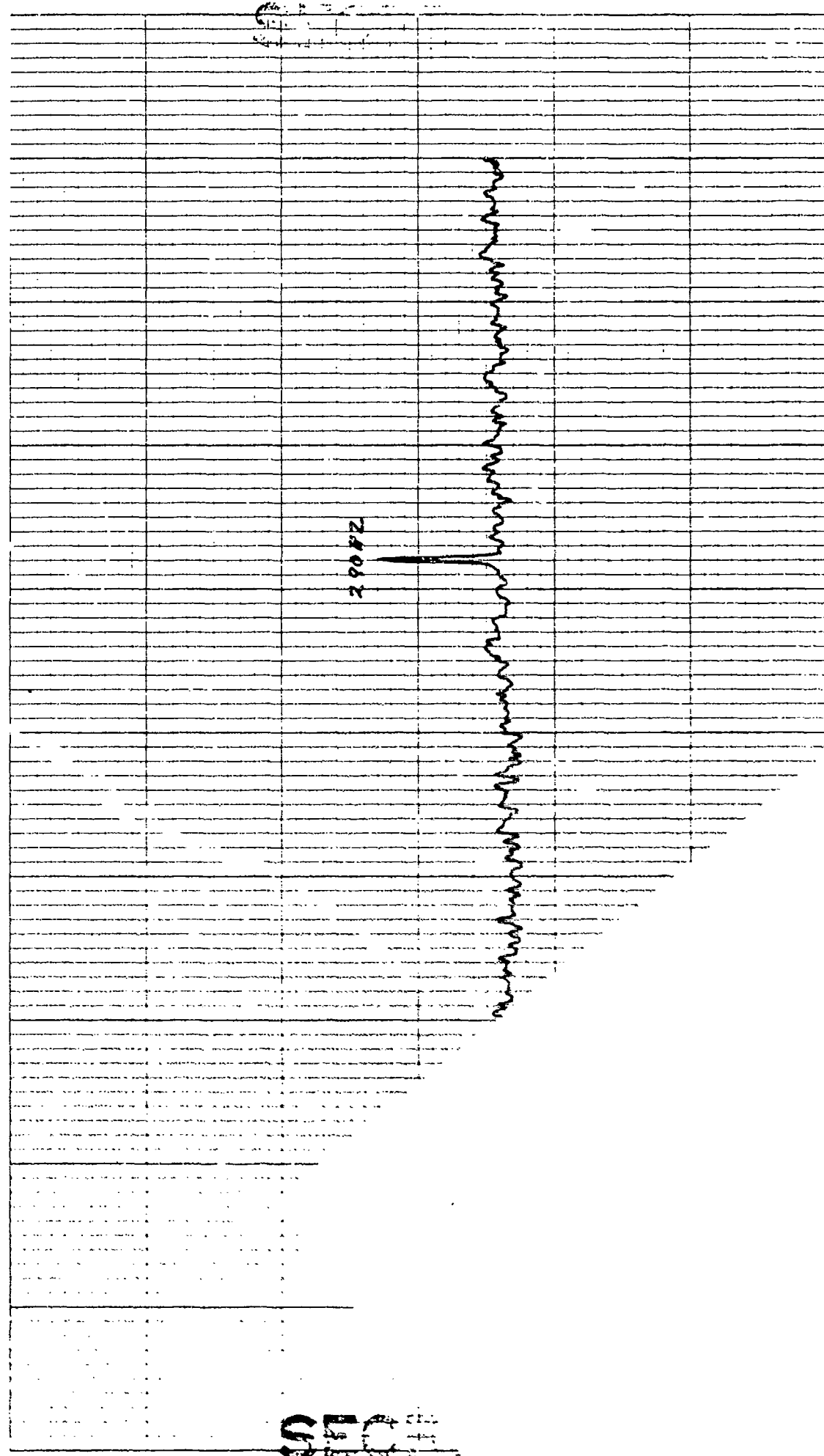
DATE OF ANALYSIS:

DATE/TIME: 3-6-77 -0835 Z
ANALYSIS BANDWIDTH: 1/1CHZ
— DEG AZ STEERING

REEL: H22

INDEX 566

INTEGRATION TIME 320 SECS
ATTEN: — DB
FILTER WTG: HANNING

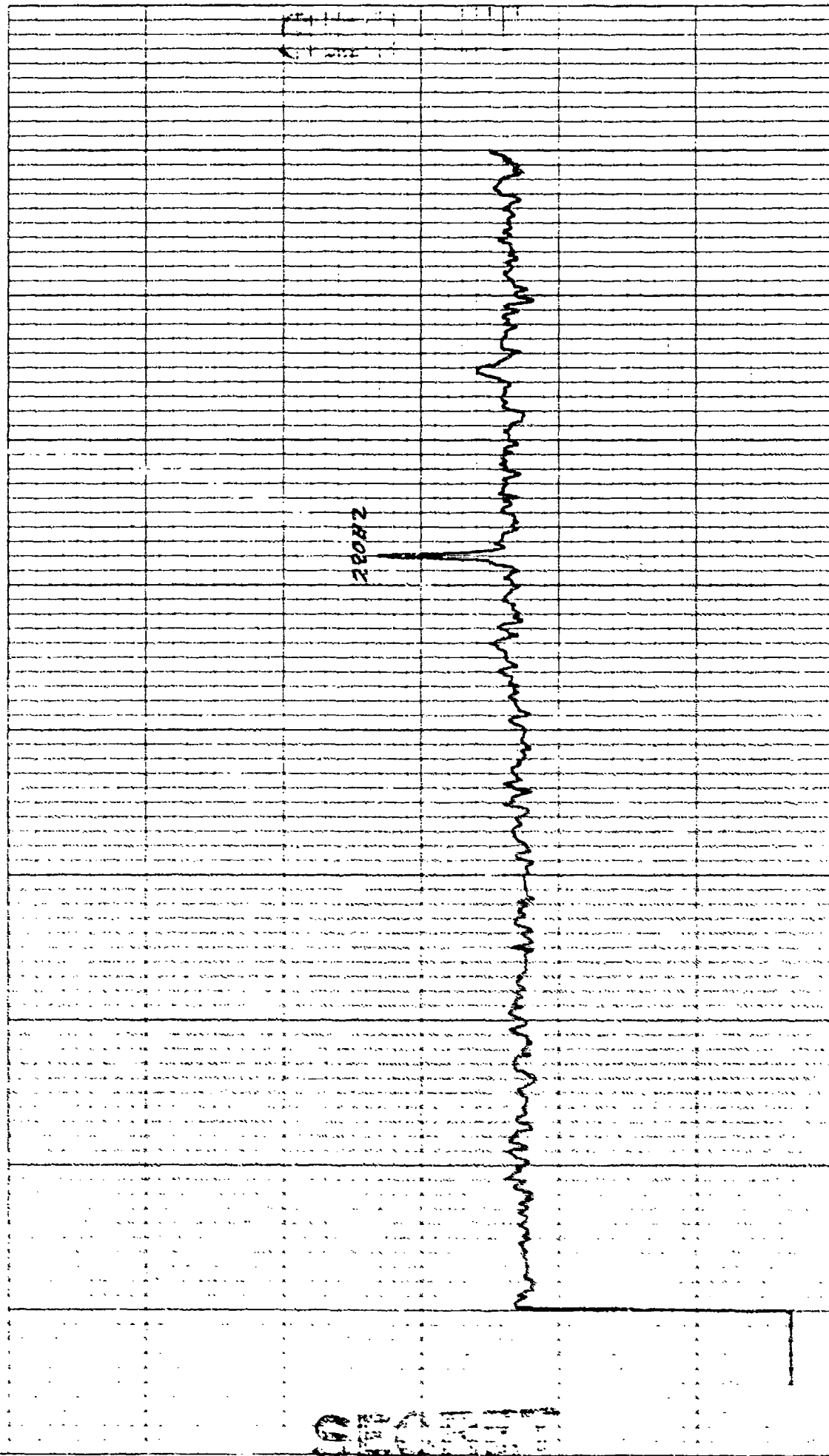


46 0703

REEL: M22 INDEX: 566

INTEGRATION TIME 320 SECS ATTN: - DB
FILTER WTG: HANNING

DATE OF ANALYSIS:
DATE/TIME: 3-16-77 - 0935 Z
ANALYSIS BANDWIDTH: 1710HZ
— DEC AZ STEERING



45 0703

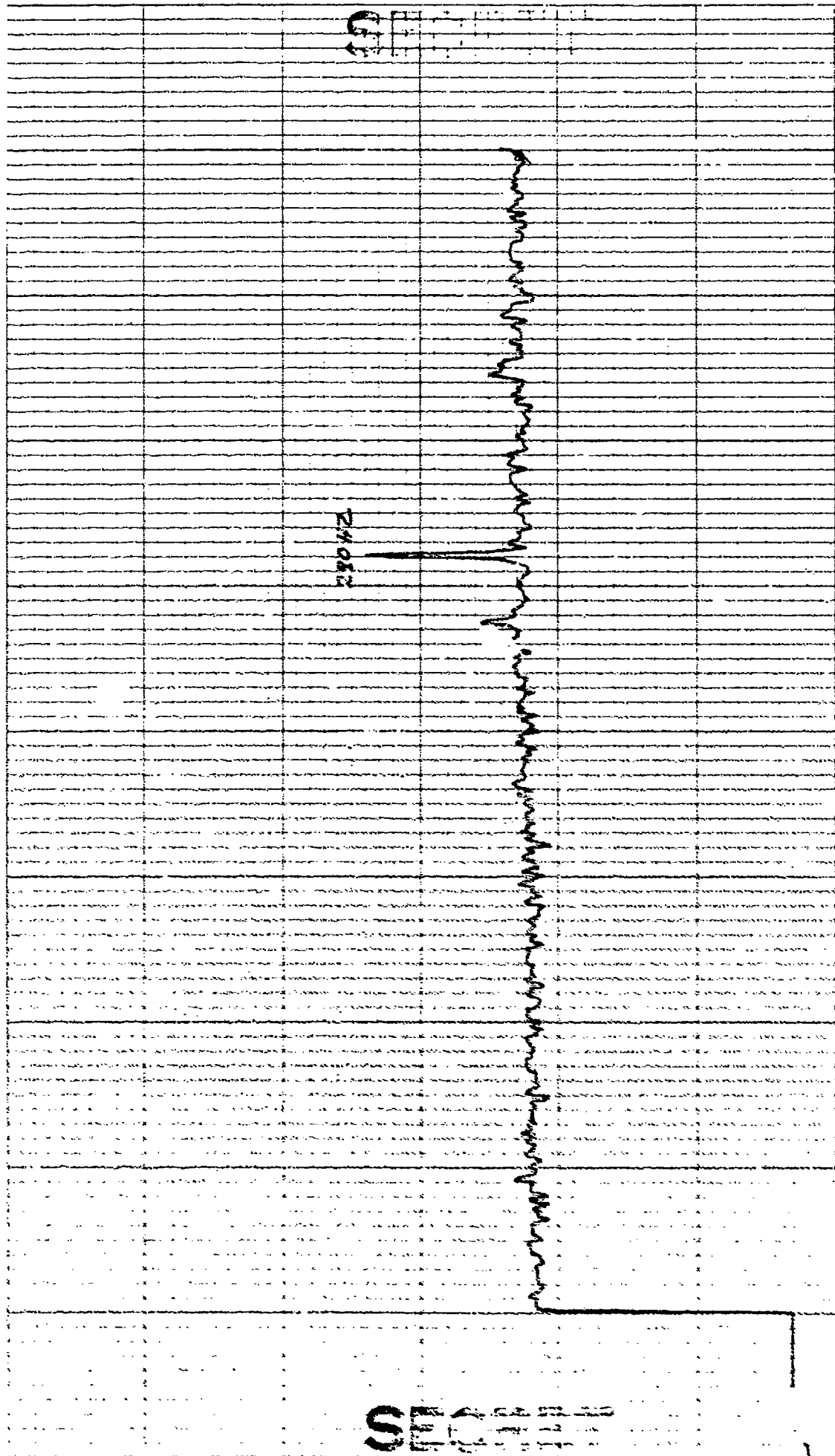
CONTROL: 346-085 (60)
OMNI SPECTRUM (ELEMENT 16)
EXERCISE: BEARING STAKE
CENTER FREQ: 280 MHZ
1 ELEMENT

DATE OF ANALYSIS:

DATE/TIME: 3-16-77 - 0935Z
ANALYSIS BANDWIDTH: 1/10HZ
-- DEC AZ STEERING

REEL: M22
INDEX 566

INTEGRATION TIME 320 SECS ATTN: DB
 FILTER WTG: HANNING



1602

10 X 10 TO THE INCHES 1/2 X 10 INCHES

46 C703

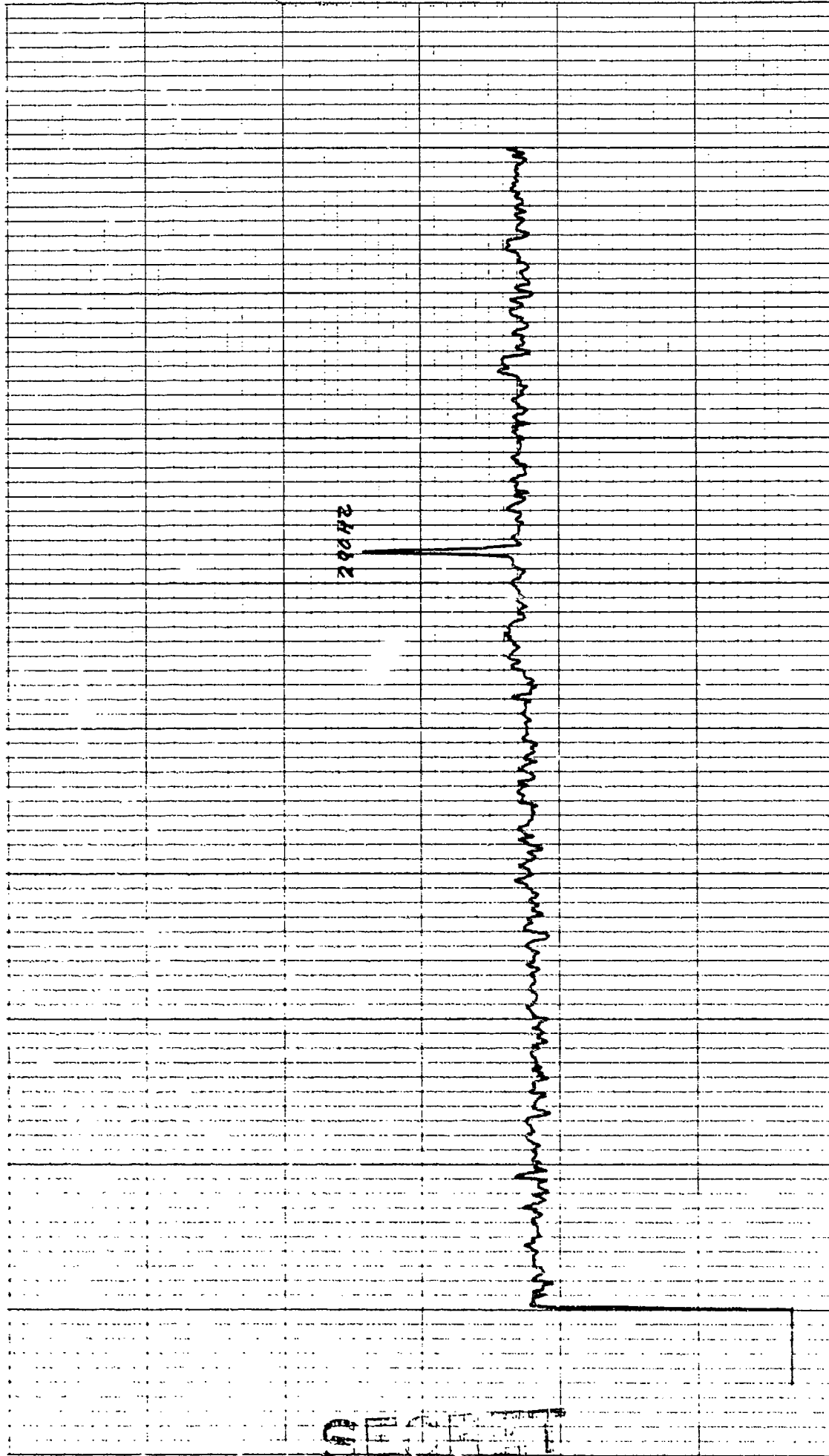
CONTROL: 3-16-0035(6/)
OMNI SPECTRUM(ELEMENT 19)
EXERCISE: REARING STAKE
CENTER FREQ: 280 HZ
1 ELEMENT

DATE OF ANALYSIS:

DATE/TIME: 3-16-77 - 0135 Z
ANALYSIS BANDWIDTH: 1/10 HZ
— DEG AZ STEERING

REEL: 1122 INDEX 566

INTEGRATION TIME 320 SECS
FILTER
ATTEN: - DB
WTG: HANNING



10 X 10 TO THE INCH • 7 X 10 IN. HES
KEUFFEL & ESSER CO. MADE IN U.S.A.

46 0703

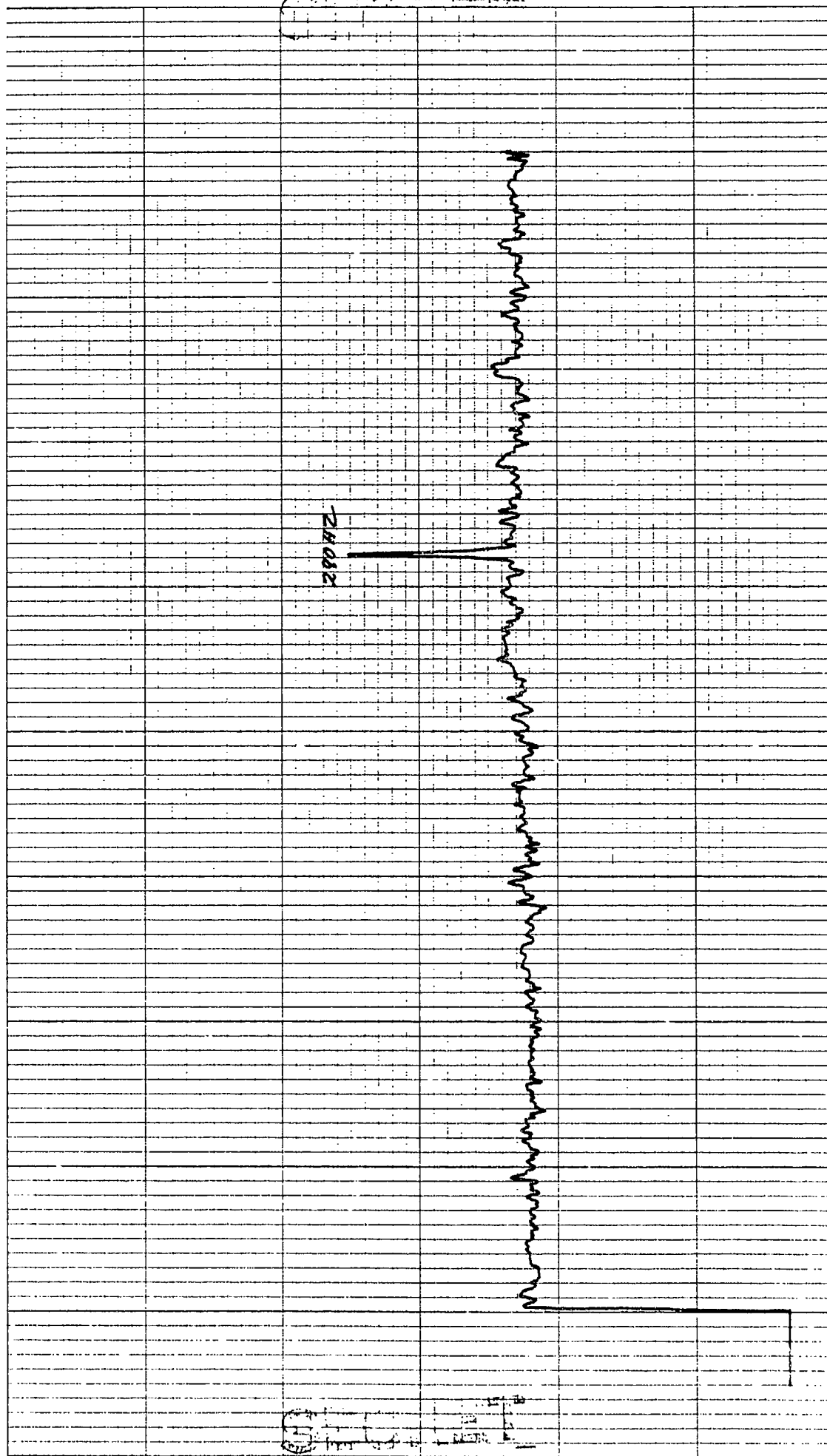
CONTROL: 316 - 0835 (62)
OMNI SPECTRUM (ELEMENT 20)
EXERCISE: BEARING STAKE
CENTER FREQ: 280 HZ
1 ELEMENT

DATE OF ANALYSIS:

DATE/TIME: 3-16-77 - 0833 Z
ANALYSIS BANDWIDTH: 1/10 HZ
— DEG AZ STEERING

REEL: M22 INDEX 566

INTEGRATION TIME 320 SECS
ATTEN: - DB
FILTER WTG: HANNING



K-2 10 X 10 TO THE INCH • 7 X 10 INCHES
KEUFFEL & ESSER CO. MADE IN U.S.A.

46 0703

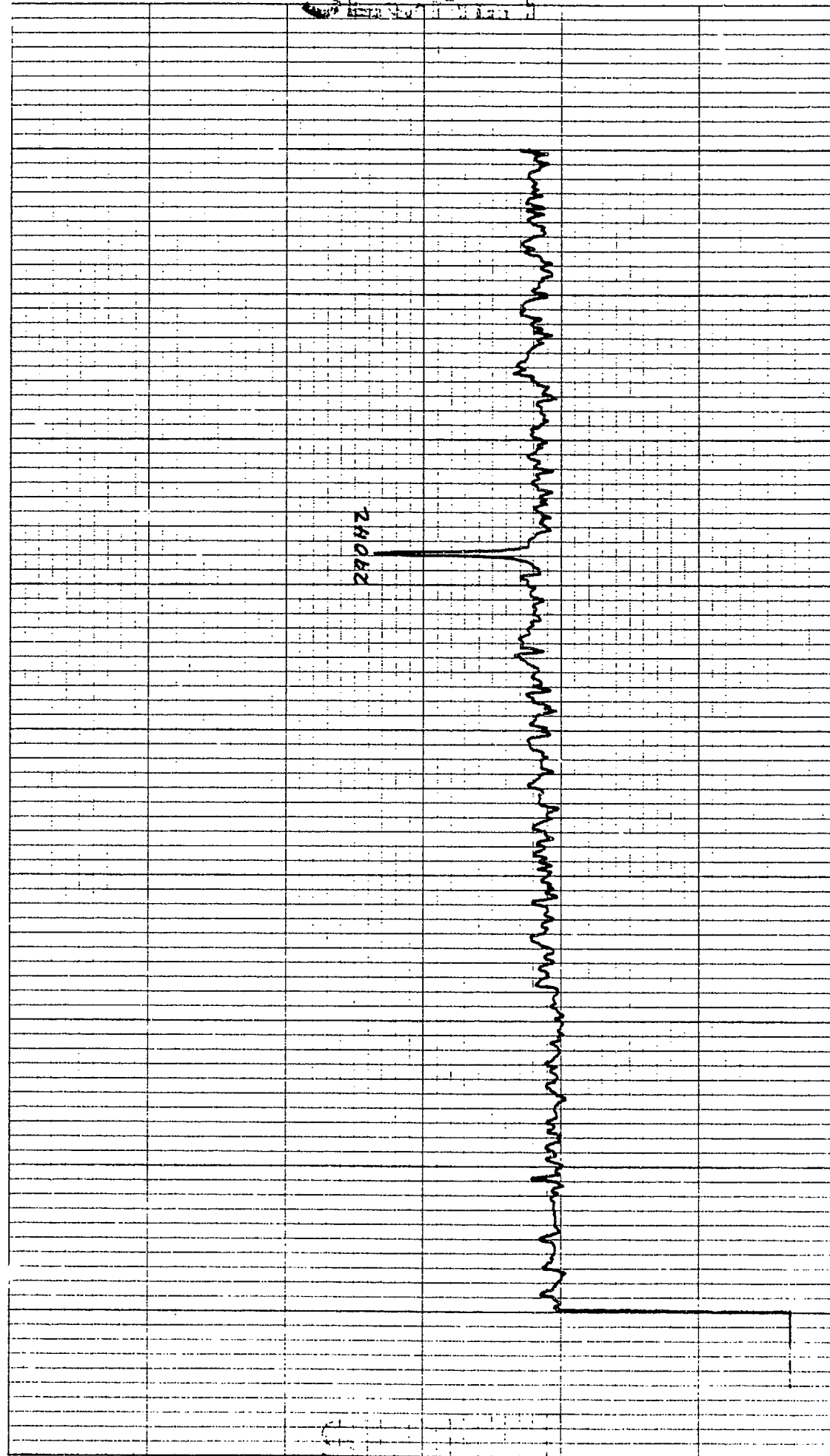
CONTROL: 3-16-0935 (63)
OMNI SPECTRUM (ELEMENT 23)
EXERCISE: BEARING STAKE
CENTER FREQ: 280 HZ
1 ELEMENT

DATE OF ANALYSIS:

DATE/TIME: 3-16-77 - 0935 Z
ANALYSIS BANDWIDTH: 1/10 HZ
— DEC AZ STEERING

REEL: M22 INDEX 566

INTEGRATION TIME 320 SECS ATTN: - DB
FILTER WTG: HANNING



10 X 10 TO THE INCH • 7 X 10 INCHES
KEUFFEL & ESSER CO. MADE IN U.S.A.

46 0703

CONTROL: 3-16-0935 (64)
OMNI SPECTRUM (ELEMENT 24)
EXERCISE: BEARING STAKE
CENTER FREQ: 280 HZ
1 ELEMENT

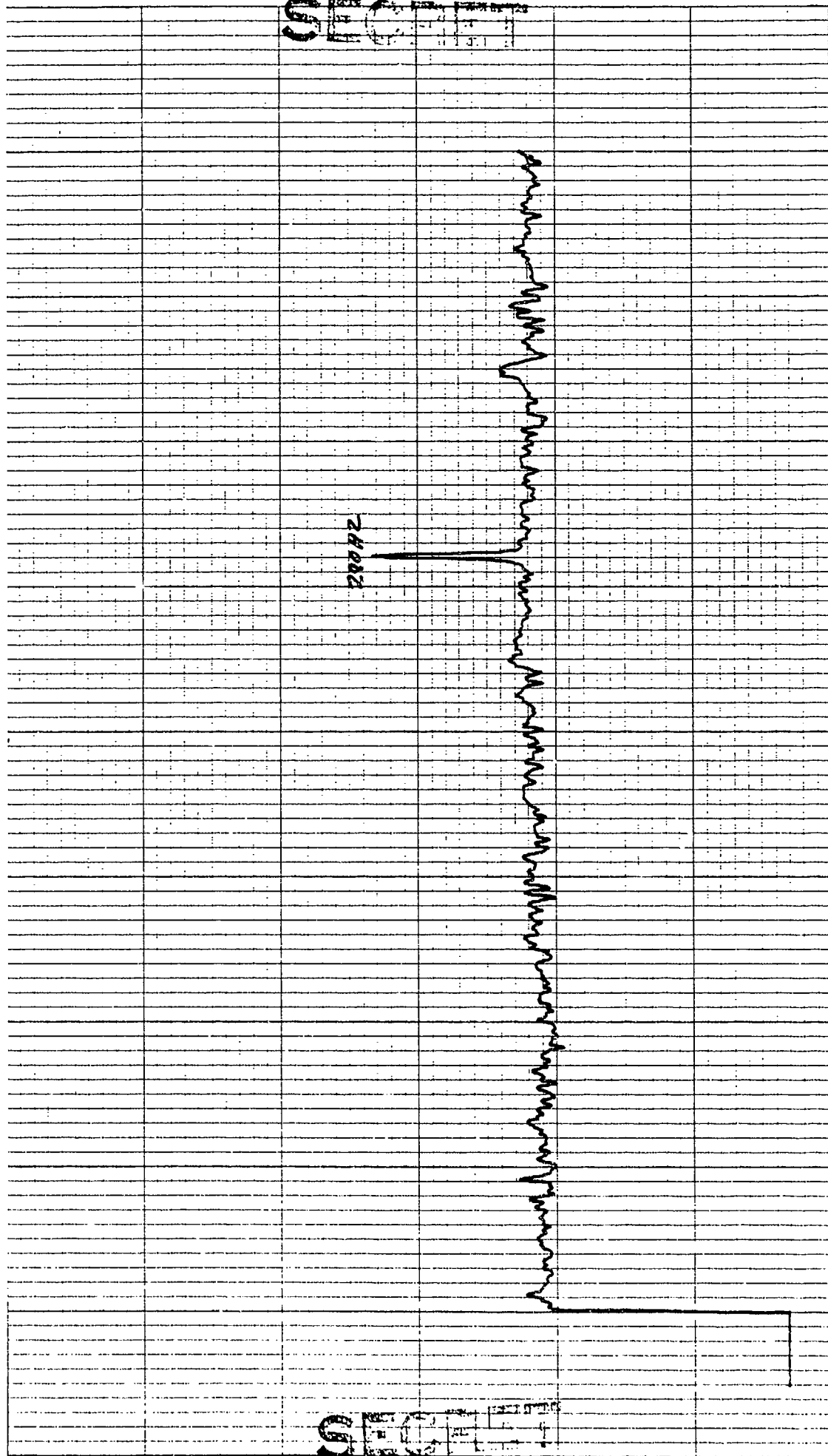
DATE OF ANALYSIS:

DATE/TIME: 3-16-77 - 0935 Z
ANALYSIS BANDWIDTH: 1/10 HZ
— DEG AZ STEERING

REEL: M22

INDEX 566

INTEGRATION TIME 320 SECS
ATTEN: — DB
FILTER
WTG: HANNING



46 0703

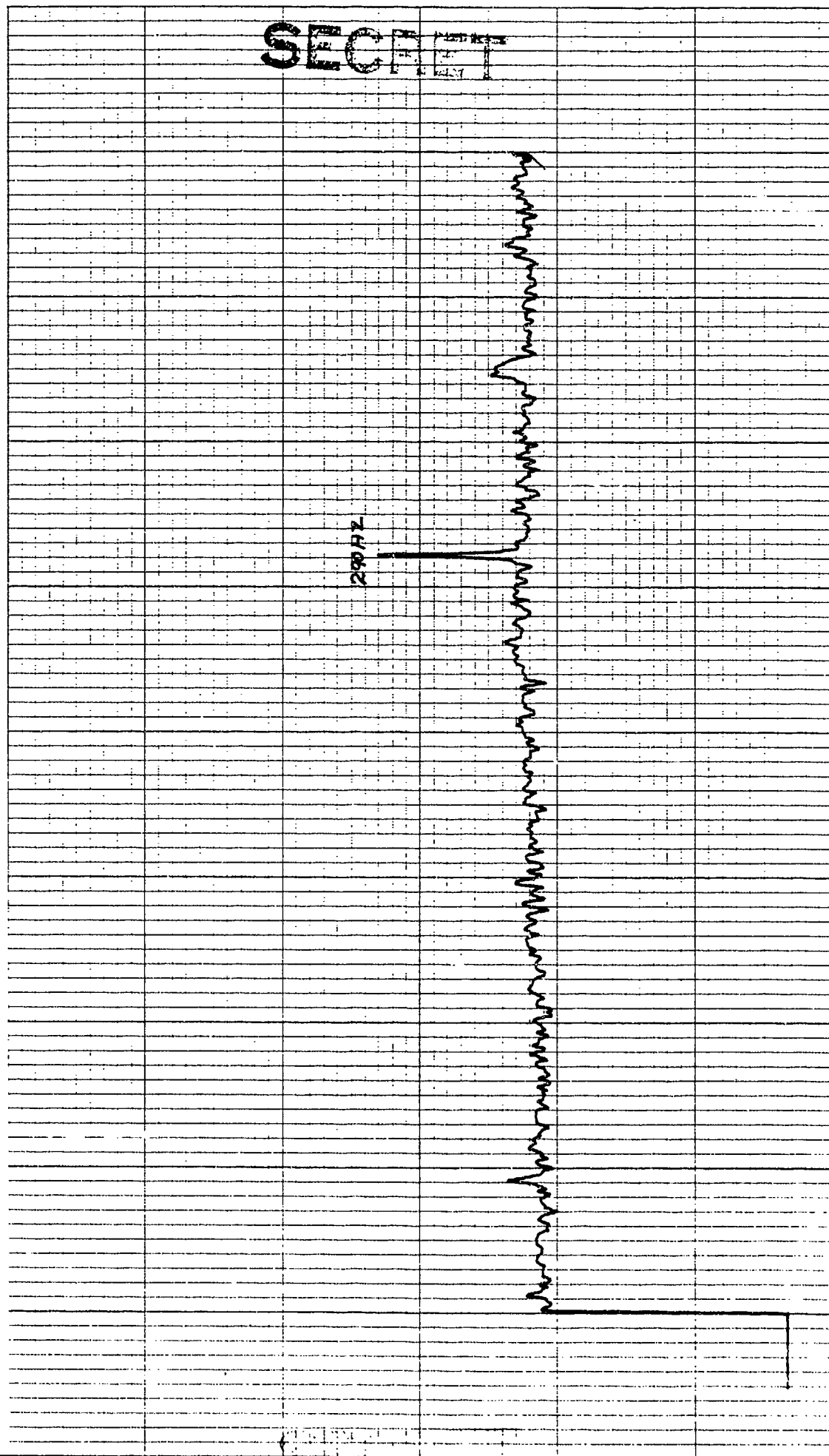
DATE OF ANALYSIS:

DATE/TIME: 3-16-77 - 0935 Z
ANALYSIS BANDWIDTH: 1/10HZ
- DEG AZ STEERING

REEL: 1122

INDEX 566

INTEGRATION TIME 320 SECS ATTN: - DB
 FILTER WTC: HANNING

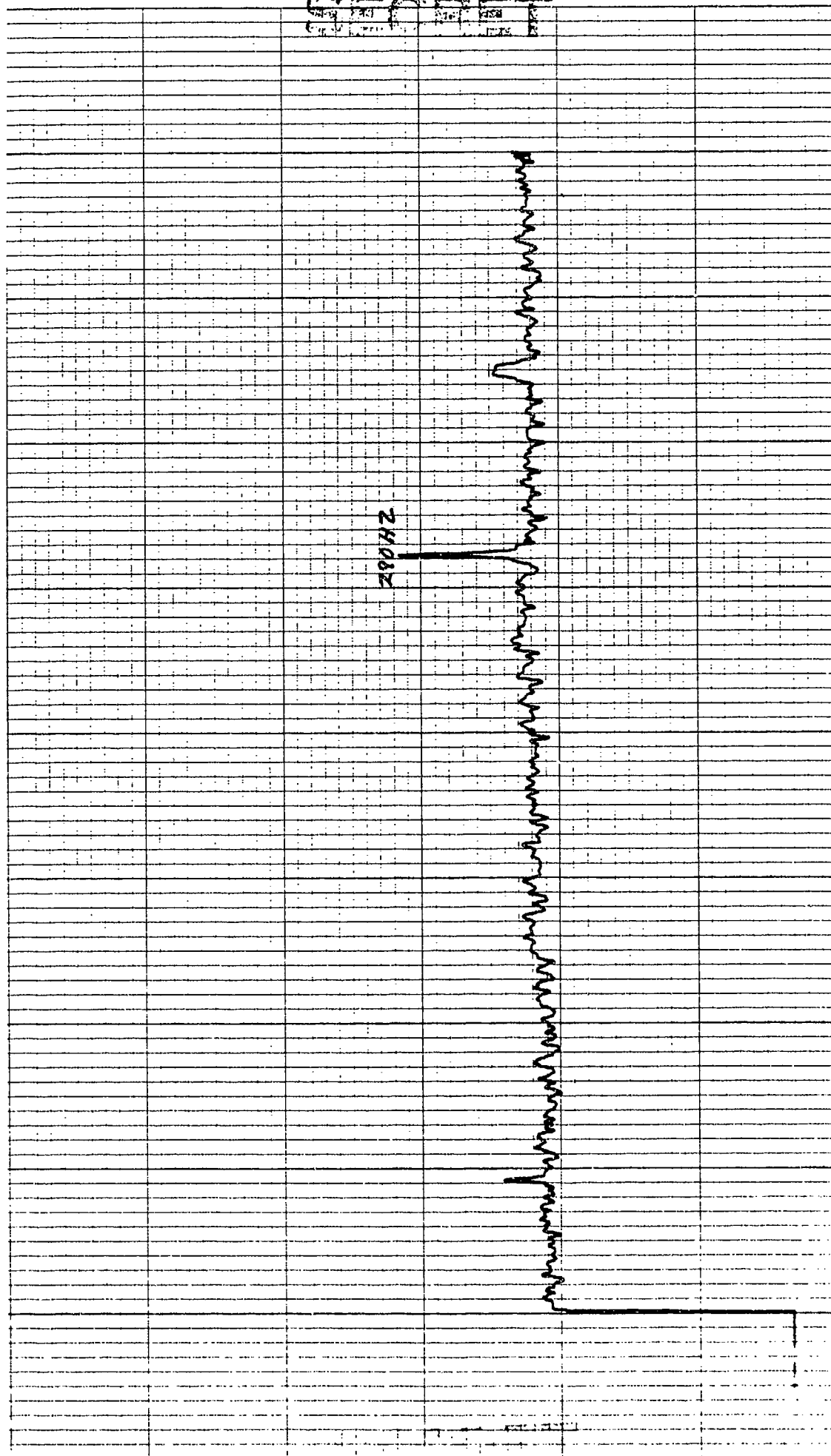


SECRET

K-Σ 10 X 10 TO THE INCH 7 X 10 INCHES
KEUFFEL & ESSER CO. MADE IN U.S.A.

46 0703

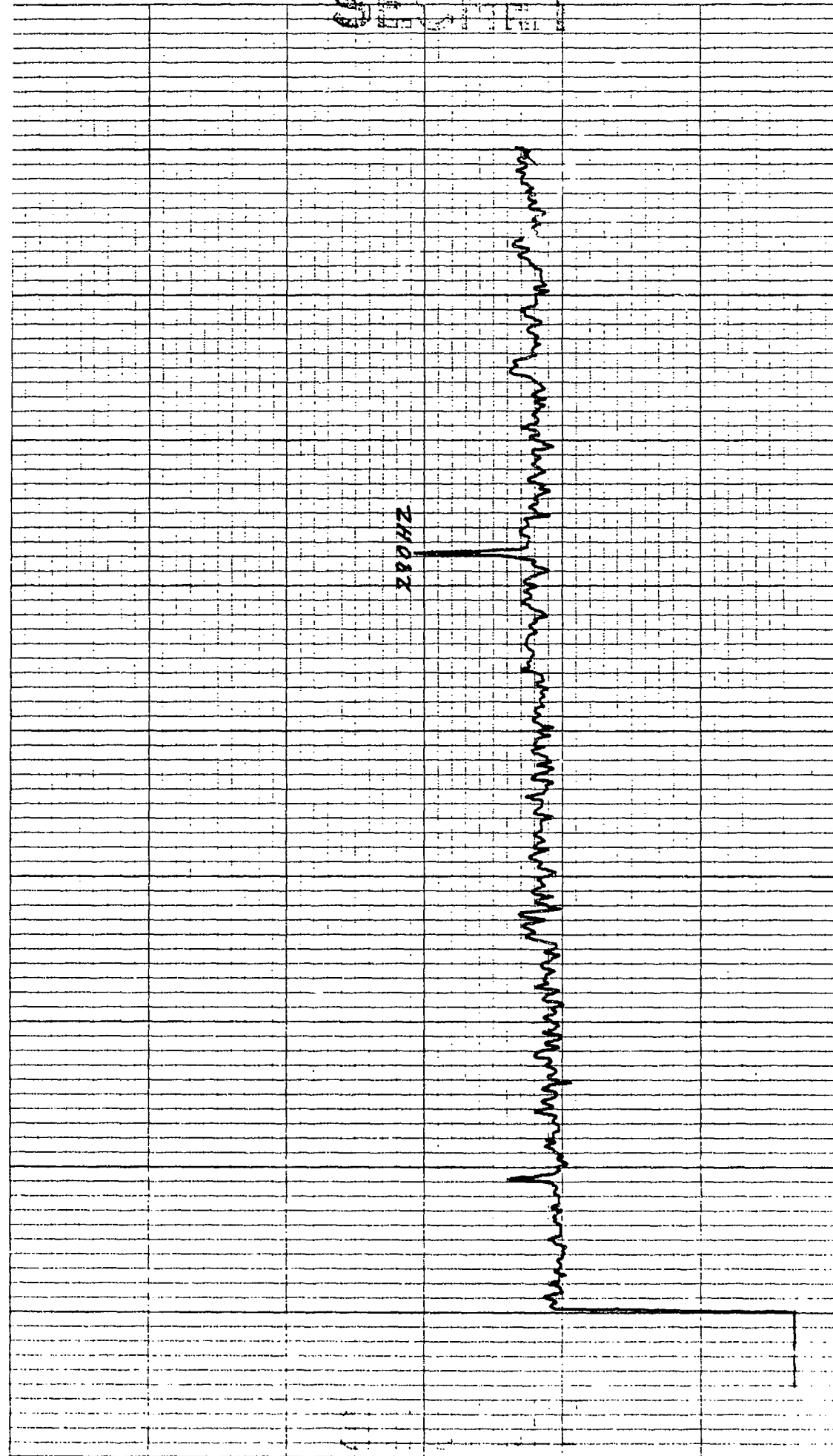
CONTROL: 3-16-0935 (66) DATE OF ANALYSIS: REEL: M22 INDEX 566
OMNI SPECTRUM (ELEMENT 29)
EXERCISE: BEARING STAKE
CENTER FREQ: 280 HZ
INTEGRATION TIME 320 SECS ATTN: DB
1 ELEMENT FILTER WTC: HANNING
ANALYSIS BANDWIDTH: 1/10 HZ
— DEG AZ STEERING



K&E 10 X 10 TO THE INCH • 7 X 10 INCHES
KEUFFEL & ESSER CO. MADE IN U.S.A.

46 0703

CONTROL: 3-16-0035 (67) DATE OF ANALYSIS: REEL: 1122 INDEX 566
OMNI SPECTRUM (ELEMENT 31)
EXERCISE: BEARING STAKE
CENTER FREQ: 280 HZ
1 ELEMENT
ANALYSIS BANDWIDTH: 11/10 HZ
INTEGRATION TIME 320 SECS
ATTEN: - DB
FILTER WTG: HANNING



K-E 10 X 10 TO THE INCH • 7 X 10 INCHES
KEUFFEL & ESSER CO. MADE IN U.S.A.

46 0703

CONTROL: 3-16-0935 (18)
OMNI SPECTRUM (ELEMENT 33)
EXERCISE: BEARING STAKE
CENTER FREQ: 280 HZ
1 ELEMENT

DATE OF ANALYSIS:

DATE/TIME: 3-16-77 - 0935Z

ANALYSIS BANDWIDTH: 1/10 HZ
— DEG AZ STEERING

REEL: M22

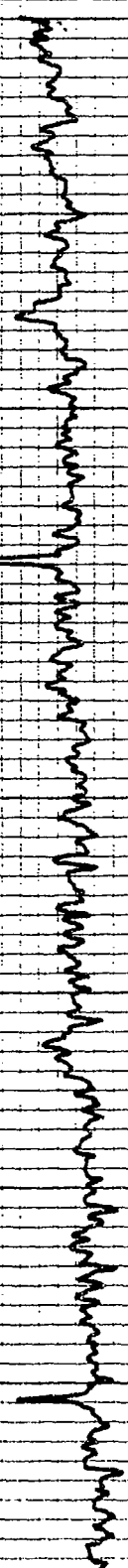
INDEX 561

INTEGRATION TIME 320 SECS
FILTER WTG: HANNING

ATTEN: - DB

SECRET

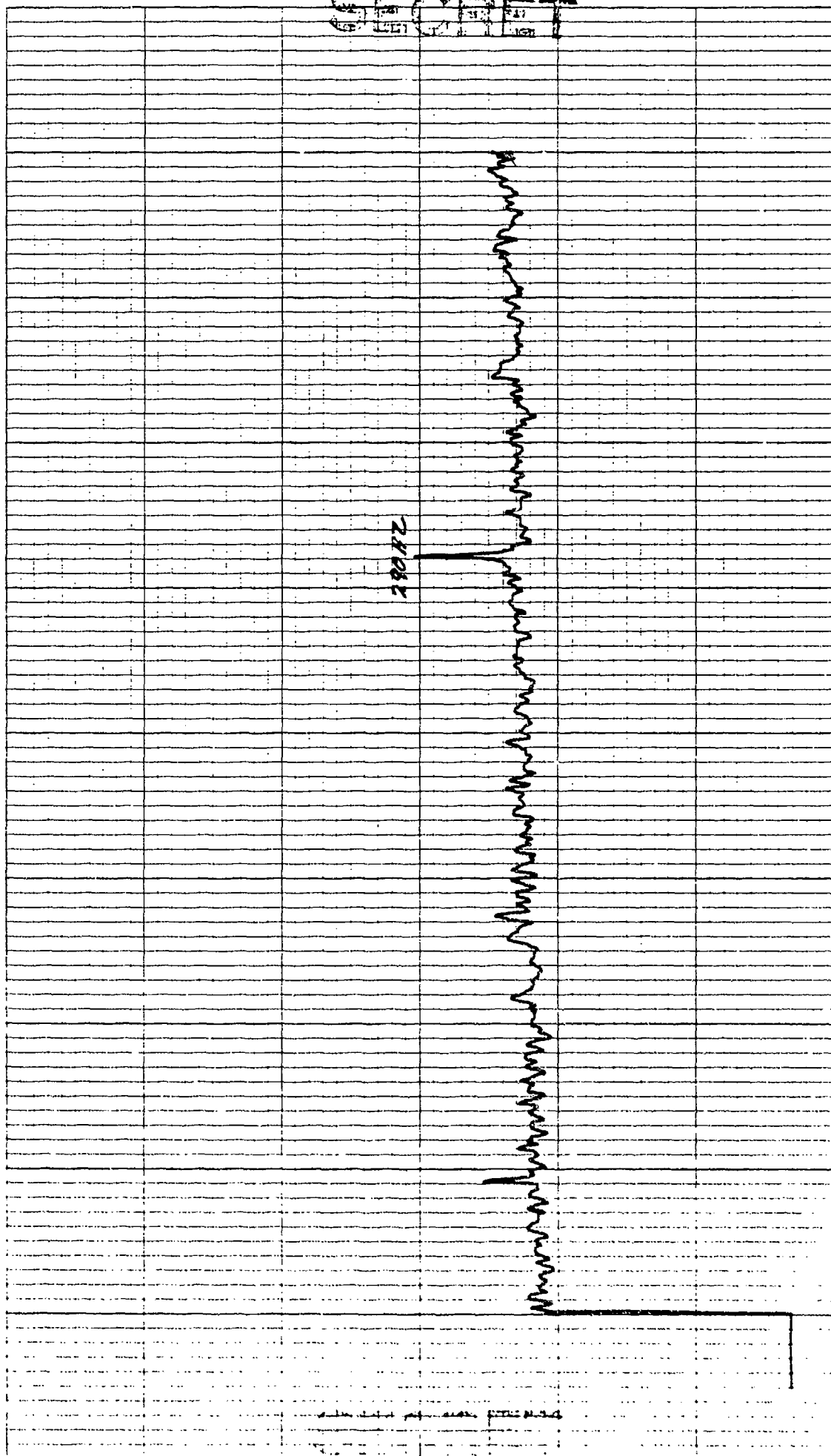
280 HZ



K-2 10 X 10 TO THE INCH • 7 X 10 INCHES
KEUFFEL & ESSER CO. MADE IN U.S.A.

46 0703

CONTROL: 3-16-0435 (61) DATE OF ANALYSIS: REEL: 422 INDEX 566
OMNI SPECTRUM (ELEMENT 35)
EXERCISE: BEARING STAKE
CENTER FREQ: 280 HZ
INTEGRATION TIME 320 SECS ATTN: - DB
1 ELEMENT FILTER WTG: HANNING
ANALYSIS BANDWIDTH: 1/10 HZ
— DEG AZ STEERING



K-5 10 X 10 TO THE INCH • 1 X 10 INCHES
HEUFFEL & ESSER CO. MADE IN U.S.A.

46 0703

CONTROL: 3-16-0935 (70)
OMNI SPECTRUM (ELEMENT 37)
EXERCISE: BEARING STAKE
CENTER FREQ: 280 HZ
1 ELEMENT

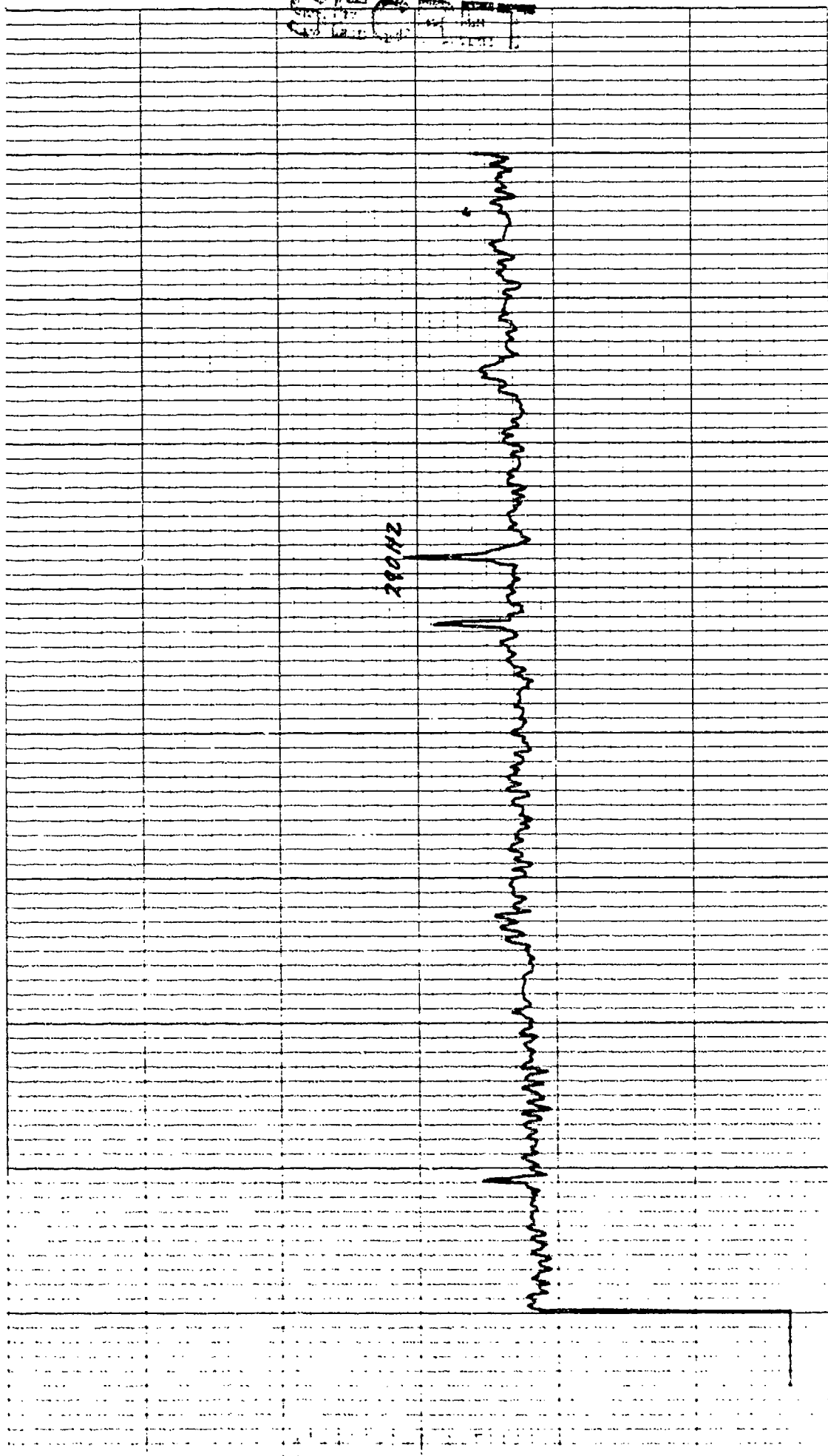
DATE OF ANALYSIS:

DATE/TIME: 3-16-77 - 0935 Z
ANALYSIS BANDWIDTH: 1/10 HZ
— DEG AZ STEERING

REEL: N22

INDEX 566

INTEGRATION TIME 320 SECS
FILTER
ATTEN: - DB
WTG: HANNING



K&E 10 X 10 TO THE INCH 7 X 10 INCHES
KEUFFEL & ESSER CO. MADE IN U.S.A.

46 0703

CONTROL: 3-16-0935 (71)
OMNI SPECTRUM (ELEMENT 39)
EXERCISE: BEARING STAKE
CENTER FREQ: 280 HZ
1 ELEMENT

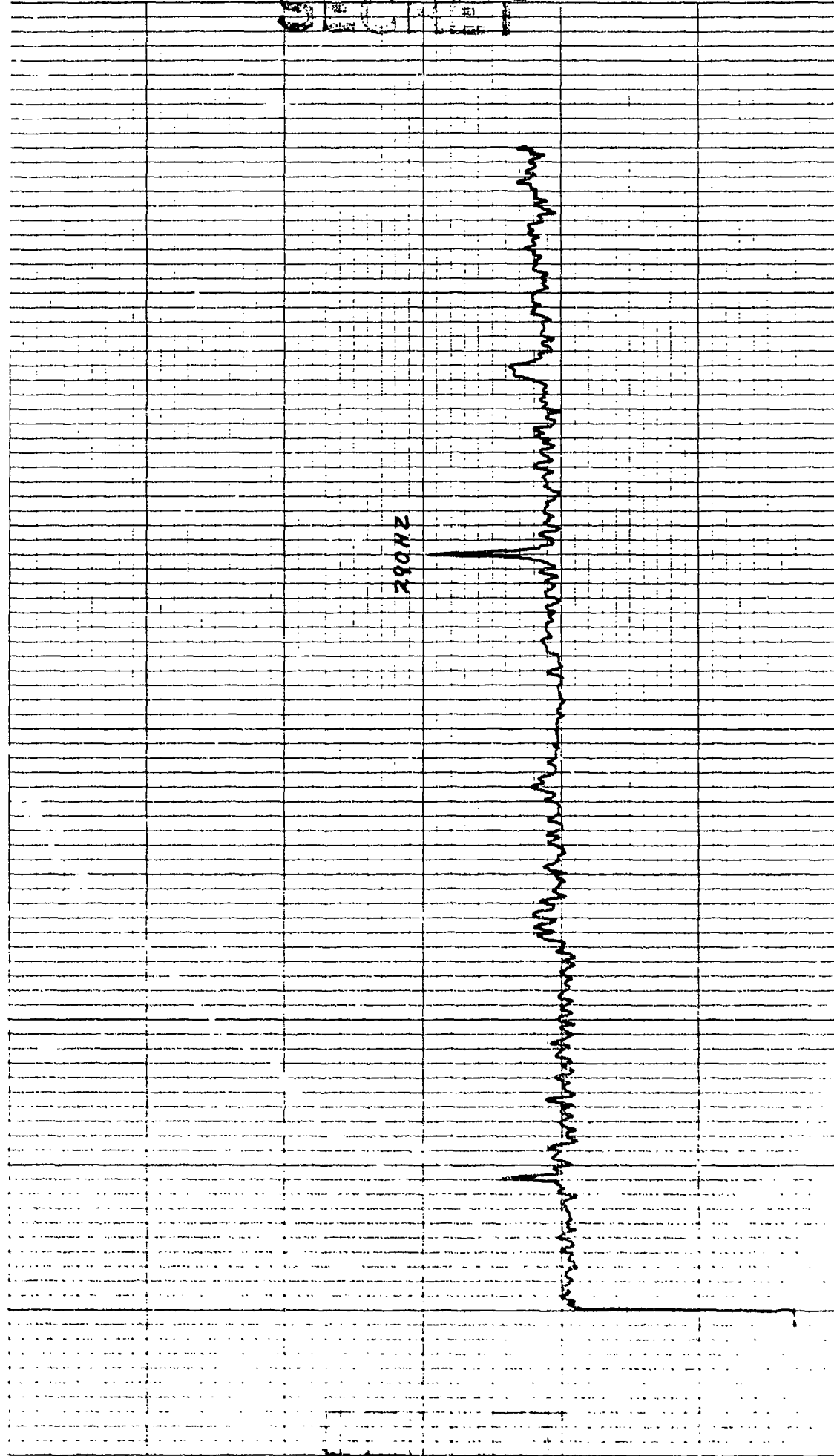
DATE OF ANALYSIS:

DATE/TIME: 3-16-77 - 0935 Z
ANALYSIS BANDWIDTH: 1/10 HZ
1 DEG AZ STEERING

REEL: M22

INDEX 566

INTEGRATION TIME 320 SECS
ATTEN: - DB
FILTER WTG: HANNING



SECRET

10 X 10 TO THE INCHES
NEUFFEL & ESSER CO. MADE IN U.S.A.

46 0703

CONTROL: 3-16-0935 (72)
OMNI SPECTRUM (ELEMENT 41)
EXERCISE: BEARING STAKE
CENTER FREQ: 280 HZ
1 ELEMENT

DATE OF ANALYSIS:

DATE/TIME: 3-16-77 - 0935 Z
ANALYSIS BANDWIDTH: 1/10 HZ
DEC AZ STEERING

REEL: M22

INDEX 522

INTEGRATION TIME 320 SECS
ATTEN: - DB
FILTER WTG: HANNING

280 HZ

SECRET

10 X 10 TO THE INCH. X 10 INCH.
MUSKIE & SONS CO. MADE IN U.S.A.

46 0703

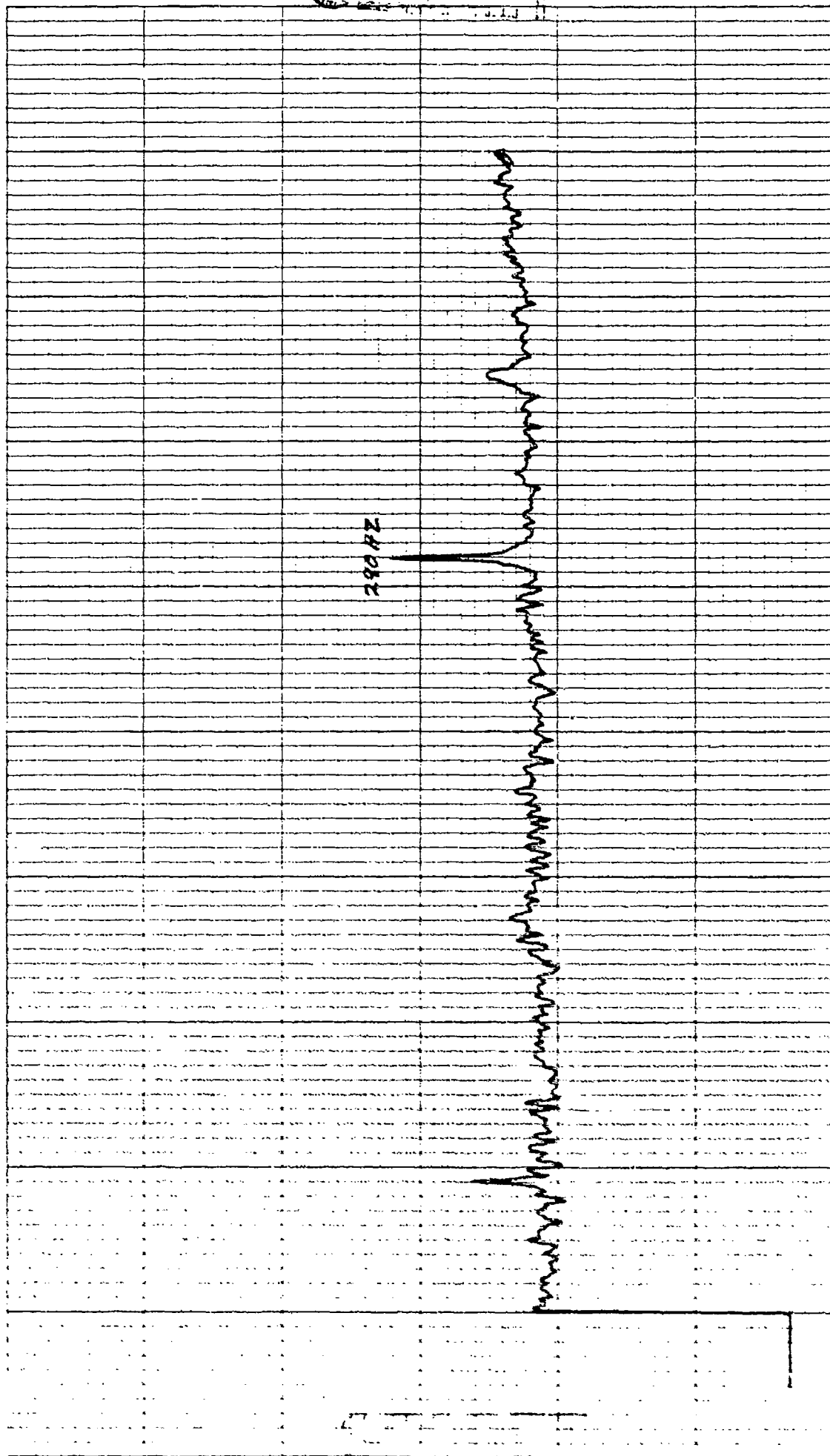
CONTROL: 3-16 -0935 (73)
OMNI SPECTRUM(ELEMENT 43)
EXERCISE: BEARING STAKE
CENTER FREQ: 280 HZ
1 ELEMENT

DATE OF ANALYSIS:

DATE/TIME: 3-16-77 -0935Z
ANALYSIS BANDWIDTH: 1/10 HZ
— DEC AZ STEERING

REEL: 1223 INDEX 566

INTEGRATION TIME 320 SECS ATTN: DB
FILTER WTC: HANNING



SECRET

10 X 10 TO THE INCHES 1 X 10 IN THE HZ

46 0703

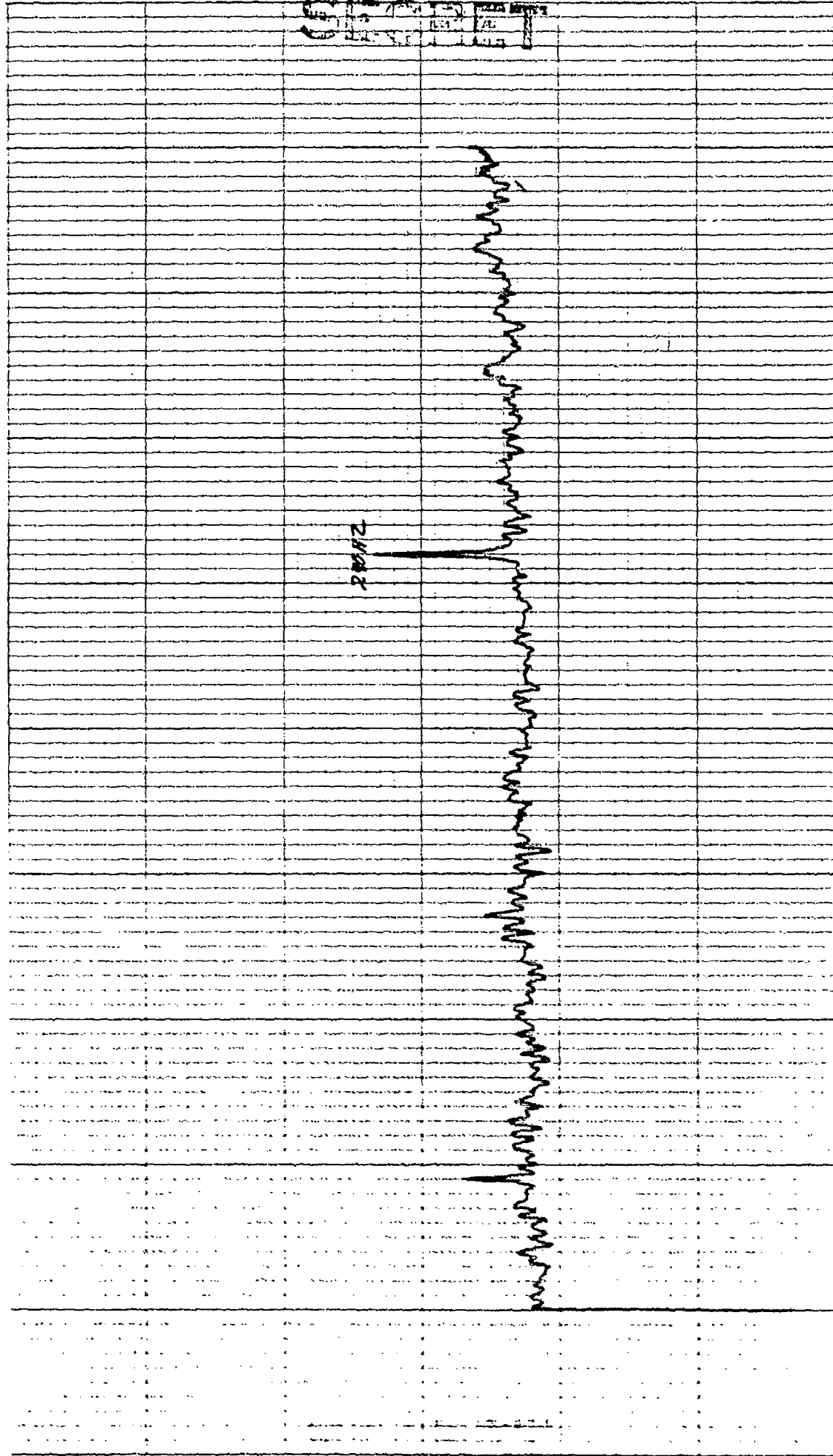
CONTROL: 346 - 0075 (74)
OMNI SPECTRUM (ELEMENT 45)
EXERCISE: BEARING STAKE
CENTER FREQ: 280 HZ
1 ELEMENT

DATE OF ANALYSIS:

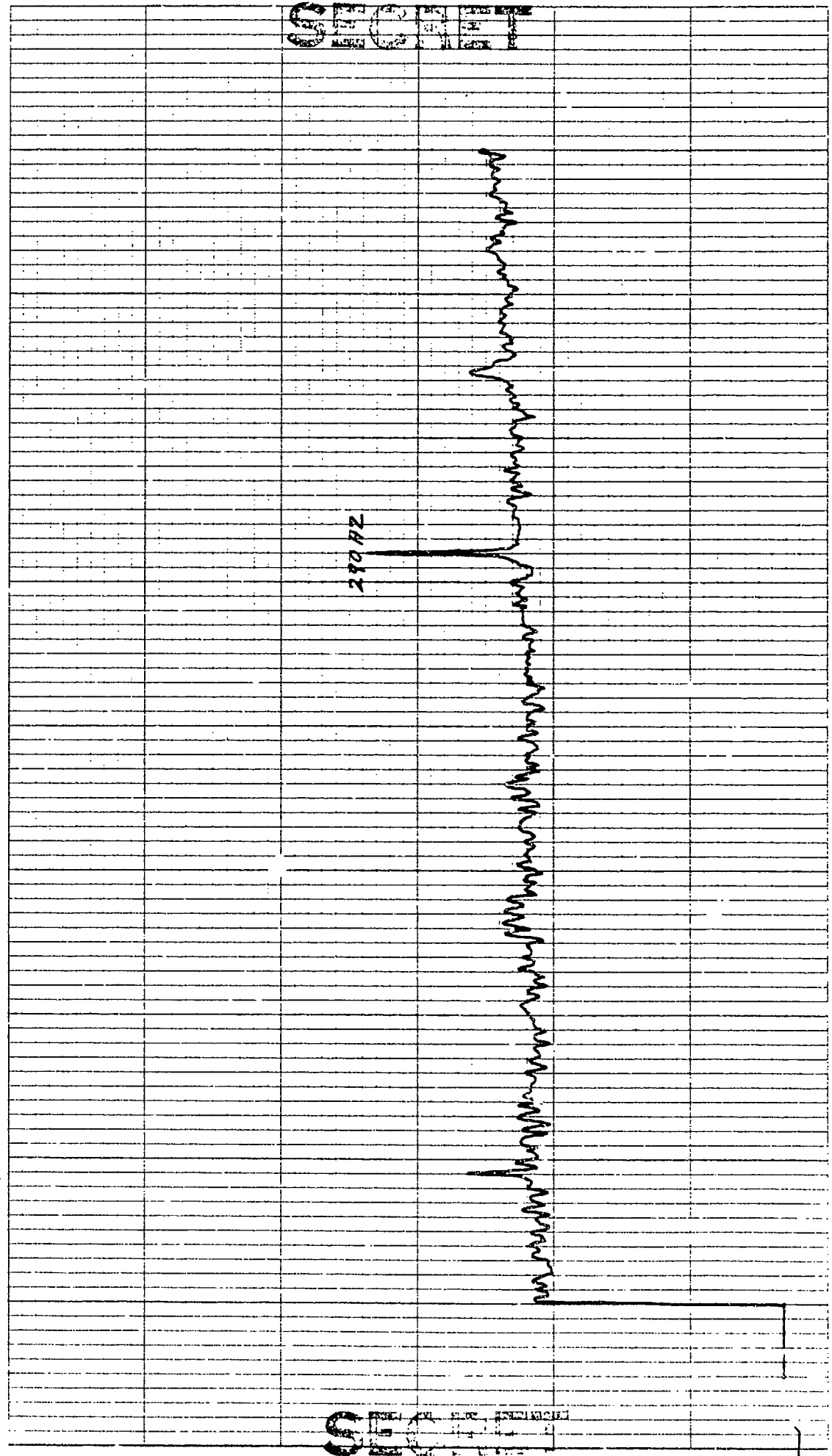
DATE/TIME: 3-16-77 - 0135 Z
ANALYSIS BANDWIDTH: 1/10 HZ
— DEC AZ STEERING

REEL: 122 INDEX 566

INTEGRATION TIME 320 SECS ATTN: DB
FILTER WTG: HANNING



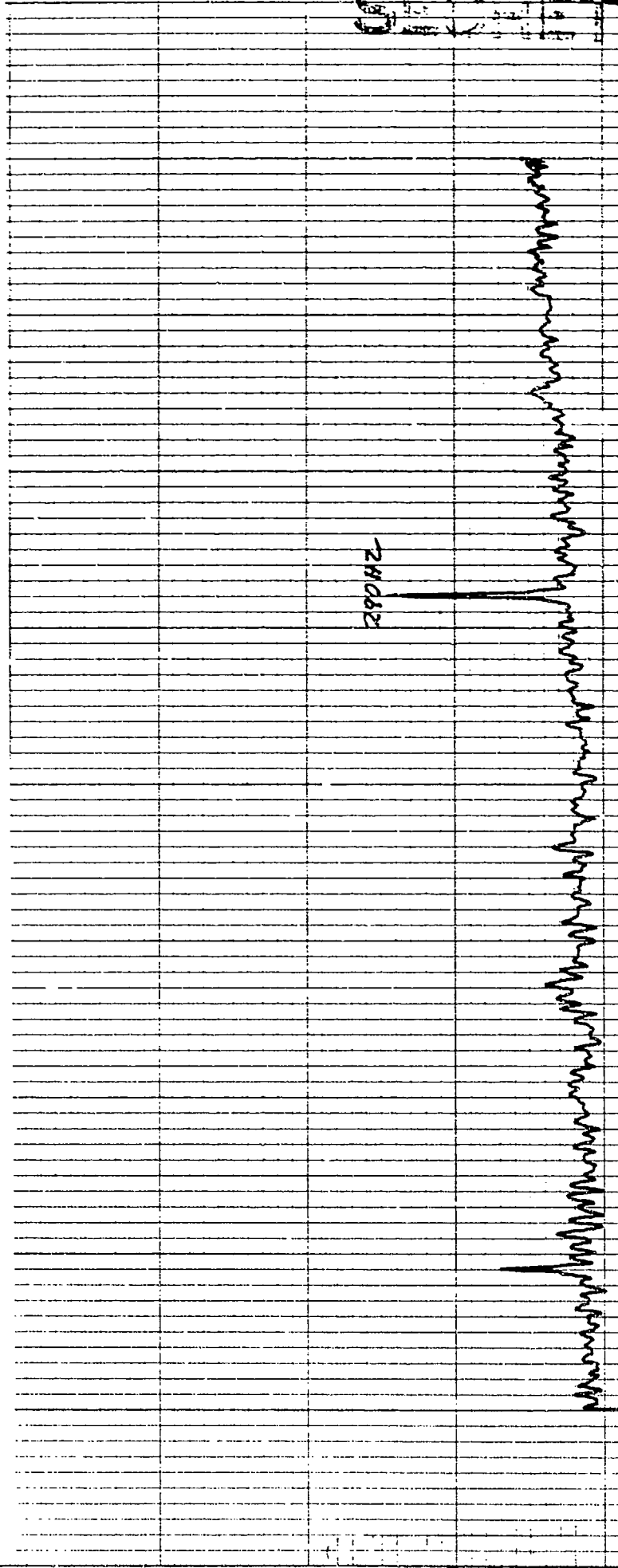
CONTROL: 3-16-0935 (75) DATE OF ANALYSIS: REEL: 1122 INDEX: 566
OMNI SPECTRUM (ELEMENT 47)
EXERCISE: BEARING STAKE
CENTER FREQ: 280 HZ ANALYSIS BANDWIDTH: 1/10 HZ INTEGRATION TIME 320 SECS ATTN: - DB
1 ELEMENT — DEG AZ STEERING FILTER WTG: HANNING



10 X 10 TO THE INCH • 1 X 10 INCHES
MUFFEL & LUSER CO. MADE IN U.S.A.

46 0703

CONTROL: 3-16-0935 (76) DATE OF ANALYSIS: REEL: 122 INDEX 546
OMNI SPECTRUM (ELEMENT 49)
EXERCISE: BEARING STAKE
CENTER FREQ: 280 HZ
INTEGRATION TIME 320 SECS ATTEN: DB
FILTER WTG: HANNING
DATE/TIME: 3-16-77 - 0935Z
ANALYSIS BANDWIDTH: 1/10 HZ
DEG AZ STEERING



10 X 10 TO THE INCH • 1 X 10 INCHES
HEUFFEL & ESSER CO. MADE IN U.S.A.

46 0703

CONTROL: 3-16 - 0935 (77)
OMNI SPECTRUM (ELEMENT 51)
EXERCISE: BEARING STAKE
CENTER FREQ: 280 HZ
1 ELEMENT

DATE OF ANALYSIS:

DATE/TIME: 3-16-77 - 0935 Z
ANALYSIS BANDWIDTH: 1/10 HZ
— DEG AZ STEERING

REEL: 1722

INDEX 566

INTEGRATION TIME 320 SECS
FILTER
ATTEN: — DB
WTC: HANNING

22042

SECRET

KOE 10 X 10 TO THE INCH • 7 X 10 INCHES
KEUFEL & ESSER CO. MADE IN U.S.A.

46 0703

CONTROL: 376-0435 (70)
OMN1 SPECTRUM (ELEMENT 53)
EXERCISE: BEARING STAKE
CENTER FREQ: 200 MZ
1 ELEMENT

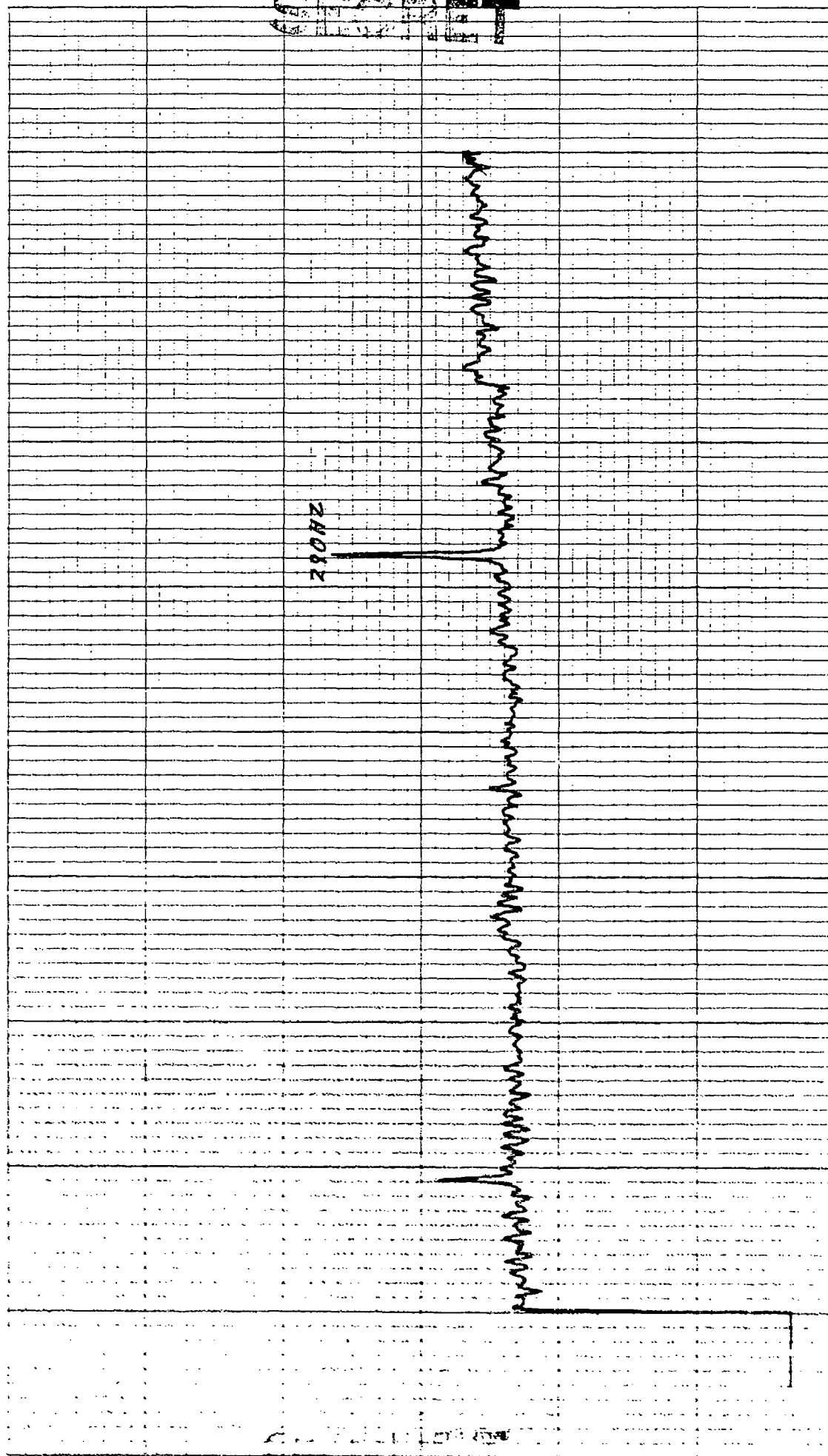
DATE OF ANALYSIS:

DATE/TIME: 3-16-77 - 0435 Z
ANALYSIS BANDWIDTH: 1/10 HZ
— DEG AZ STEERING

REEL: M23

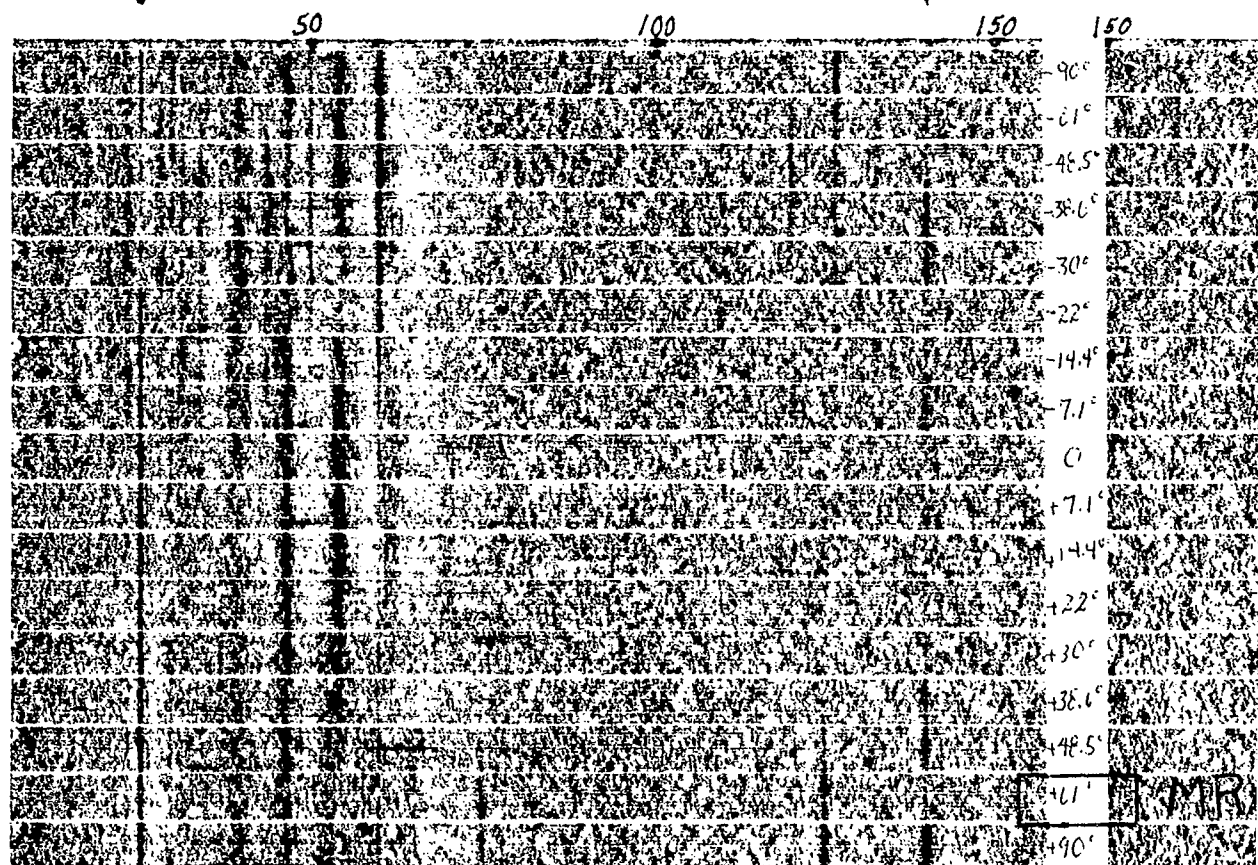
INDEX 566

INTEGRATION TIME 320 SECS
FILTER
ATTN: — DB
WTG: HANNING



25Hz

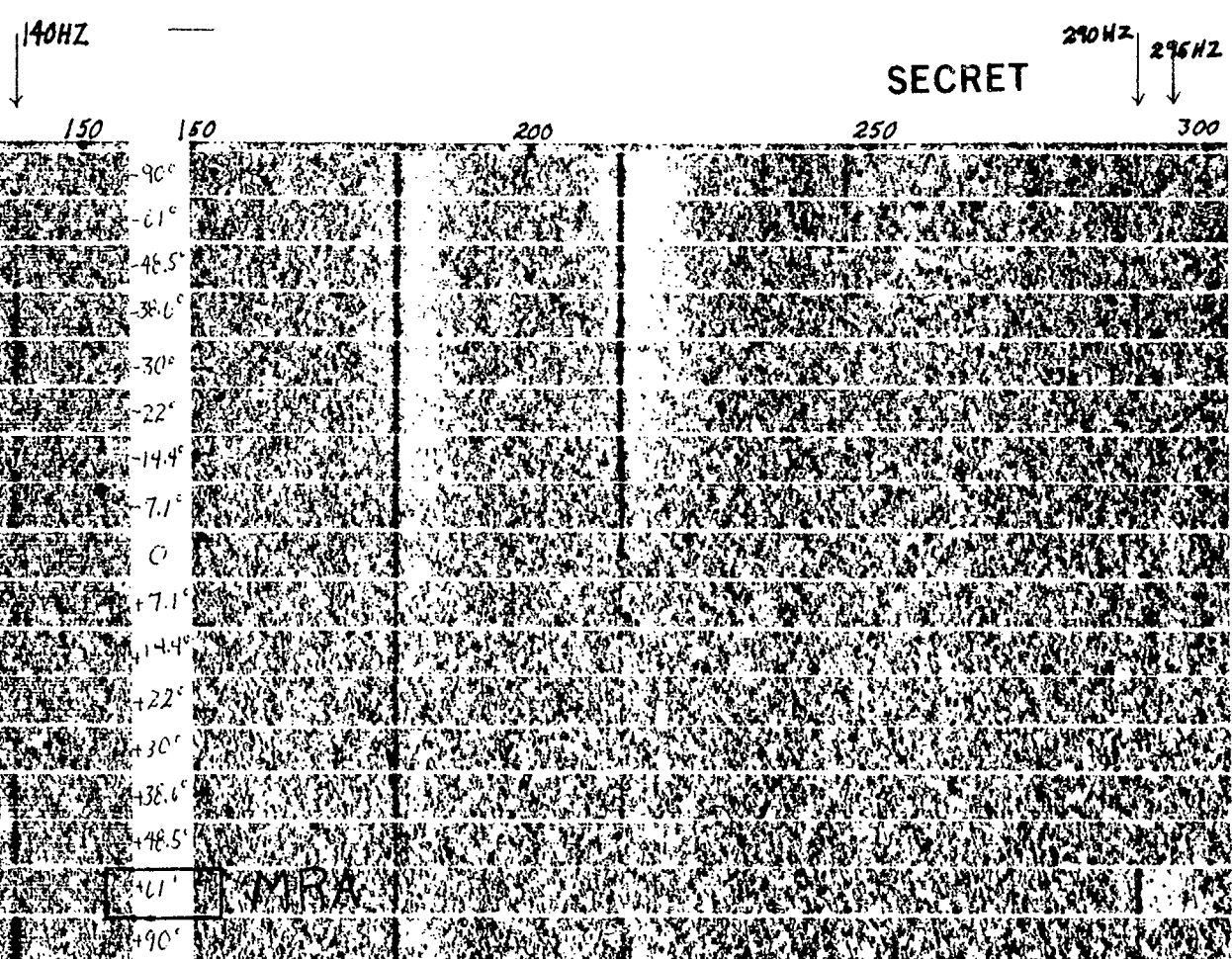
140HZ



CONTROL NUMBER 09352-49-DP11
 NUMBER OF ELEMENTS 16
 FREQUENCY BAND 10 TO 300 HZ
 RANGE 122 N.M.

HISTOGRAM
 TAPE REEL NUMBER 1122
 ANALYSIS BAND WIDTH .2
 WATER DEPTH 2800 F

2



HISTOGRAM
TAPE REEL NUMBER M22

ANALYSIS BAND WIDTH .2 HZ
WATER DEPTH 2800 FMS

TAPE COUNT 566
ELEMENT NUMBERS 1716
DATE 3-16-77 SAN-XXX-78-0139
EXERCISE: BEARING STAKE

SECRET

CONFIDENTIAL

SIGNAL LEVEL AND SNR

CALCULATIONS

DATA POINT 11

FREQUENCY 140 HZ

NUMBER OF ELEMENTS 16

SIGNAL LEVEL

MCPS-32 SIGNAL LEVEL INDICATED		<u>-28.8</u>	
MCPS-32 CAL. CORRECTION	<u>+10</u>	<u>-18.8</u>	
BEAMFORMER GAIN	<u>+18</u>	<u>- .8</u>	SIG. LEVEL FOR SNR CALCULATION
MRA CORRECTION	<u>+ .2</u>	<u>- .6</u>	SIG. LEVEL FOR SIGNAL GAIN

NOISE LEVEL

MCPS-32 SIGNAL LEVEL INDICATED		<u>-56.2</u>	
MCPS-32 CAL. CORRECTION	<u>+10</u>	<u>-46.2</u>	
BEAMFORMER GAIN	<u>+18</u>	<u>-28.2</u>	NOISE LEVEL FOR SNR CALCULATION

SIGNAL-NOISE-RATIO

SIGNAL LEVEL FOR SNR		<u>- .8</u>	
SIGNAL LEVEL FOR SNR	<u>-28.2</u>	<u>27.4</u>	
PROCESSOR CORRECTION	<u>-4.0</u>	<u>23.4</u>	
MRA CORRECTION	<u>+ .2</u>	<u>23.6</u>	SNR 1/10 HZ BAND
BANDWIDTH CONVERSION	<u>-0.2</u>	<u>15.4</u>	SNR 1 HZ BAND

~~CONFIDENTIAL~~
SIGNAL LEVEL AND SNR

CALCULATIONS

DATA POINT 11

FREQUENCY 290 HZ

NUMBER OF ELEMENTS 16

SIGNAL LEVEL

MCPS-32 SIGNAL LEVEL INDICATED		<u>-45.4</u>	
MCPS-32 CAL. CORRECTION	<u>+10</u>	<u>-35.4</u>	
BEAMFORMER GAIN	<u>+10</u>	<u>-17.4</u>	SIG. LEVEL FOR SNR CALCULATION
MRA CORRECTION	<u>+ .8</u>	<u>-16.6</u>	SIG. LEVEL FOR SIGNAL GAIN

NOISE LEVEL

MCPS-32 SIGNAL LEVEL INDICATED		<u>-64.7</u>	
MCPS-32 CAL. CORRECTION	<u>+10</u>	<u>-54.7</u>	
BEAMFORMER GAIN	<u>+10</u>	<u>-36.7</u>	NOISE LEVEL FOR SNR CALCULATION

SIGNAL-NOISE-RATIO

SIGNAL LEVEL FOR SNR		<u>-17.4</u>	
SIGNAL LEVEL FOR SNR	<u>-36.7</u>	<u>19.3</u>	
PROCESSOR CORRECTION	<u>- 4.0</u>	<u>15.3</u>	
MRA CORRECTION	<u>+ .8</u>	<u>16.1</u>	SNR 1/10 HZ BAND
BANDWIDTH CONVERSION	<u>-8.2</u>	<u>7.9</u>	SNR 1 HZ BAND

CONFIDENTIAL

DATA POINT 11SIGNAL GAIN

	<u>140 HZ</u>	<u>290HZ</u>	<u>295HZ</u>
MEAN OMNI SIGNAL LEVEL	<u>-29.8</u>	<u>-41.4</u>	<u> </u>
MRA SIGNAL LEVEL	<u>- .6</u>	<u>-16.6</u>	<u> </u>
ARRAY SIGNAL GAIN	<u>29.2</u>	<u>24.8</u>	<u> </u>
20 LOG <u>16</u>	<u>34.1</u>	<u>34.1</u>	<u> </u>
# of elements			
DIFFERENCE	<u>- 4.9</u>	<u>9.3</u>	<u> </u>

ARRAY GAIN

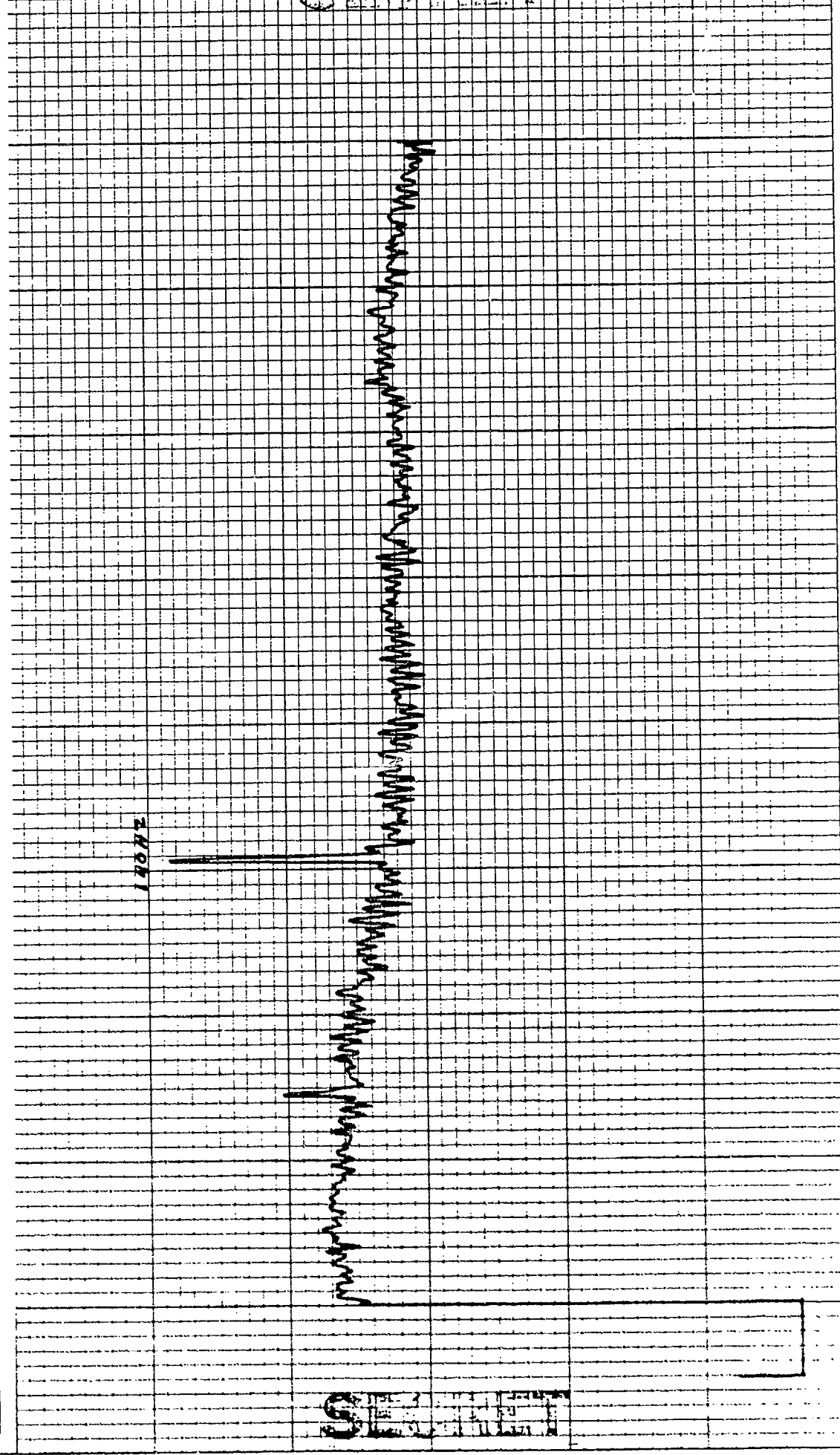
MRA SNR	<u>23.6</u>	<u>16.1</u>	<u> </u>
MEAN OMNI SNR	<u>16.2</u>	<u>8.4</u>	<u> </u>
ARRAY GAIN	<u>7.4</u>	<u>7.7</u>	<u> </u>
THEORETICAL AZMUTH GAIN (at MRA)	<u>7.6</u>	<u>9.4</u>	<u> </u>
DIFFERENCE	<u>- .2</u>	<u>-1.7</u>	<u> </u>

CONFIDENTIAL

1402 10 X 10 TO THE INCH 7 X 10 INCHES
KEUFFEL & ESSER CO. MADE IN U.S.A.

46 0703

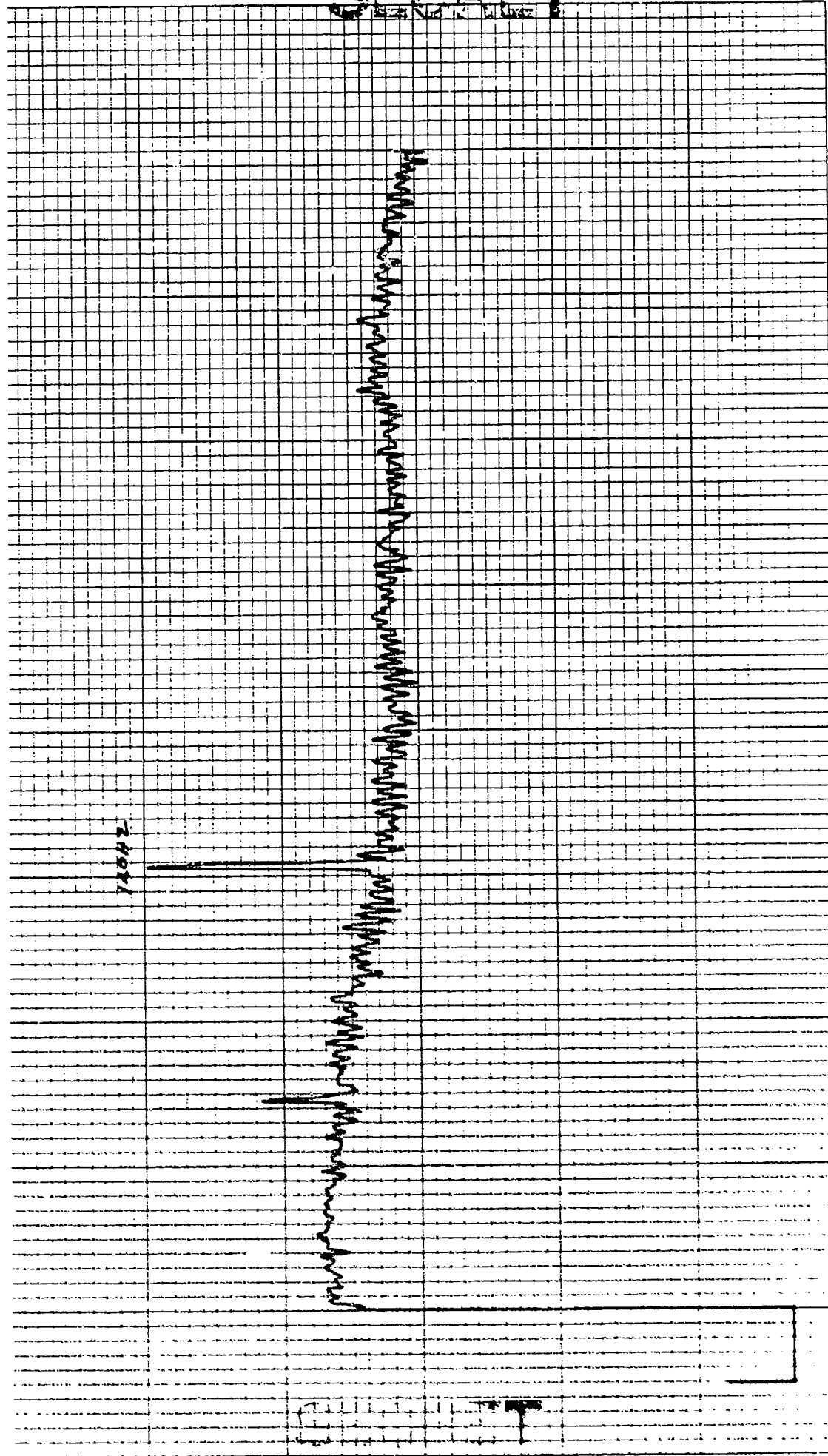
CONTROL: 0935-16 (DP11) REEL: H22 INDEX: X 566
BEAMFORMED SPECTRUM (ELEMENTS) DATE OF ANALYSIS: 1-16
EXERCISE: BEARING STAKE DATE/TIME: 3-16-77-0935Z INTEGRATION TIME: 320 SECS ATTEN: -10 DB
CENTER FREQ: 150 HZ ANALYSIS BANDWIDTH: 1/10 HZ FILTER: WTG: HANNING
16 ELEMENTS +44 DEG. AZ STEERING



K-2 10 X 10 TO THE INCH • 7 X 10 INCHES
KEUFFEL & ESSER CO. MADE IN U.S.A.

46 0703

CONTROL: 0935 - 16 (DPH) REEL: 122 INDE X 566
BEAMFORMED SPECTRUM (ELEMENTS) DATE OF ANALYSIS: 1-16
EXERCISE: BEARING STAKE DATE/TIME: 3-16-77 - 0935 Z INTEGRATION TIME 320 SECS ATTN: -18 DB
CENTER FREQ: 150 HZ ANALYSIS BANDWIDTH: 1/10 HZ FILTER WTG: HANNING
16 ELEMENTS +46 DEG. AZ STEERING



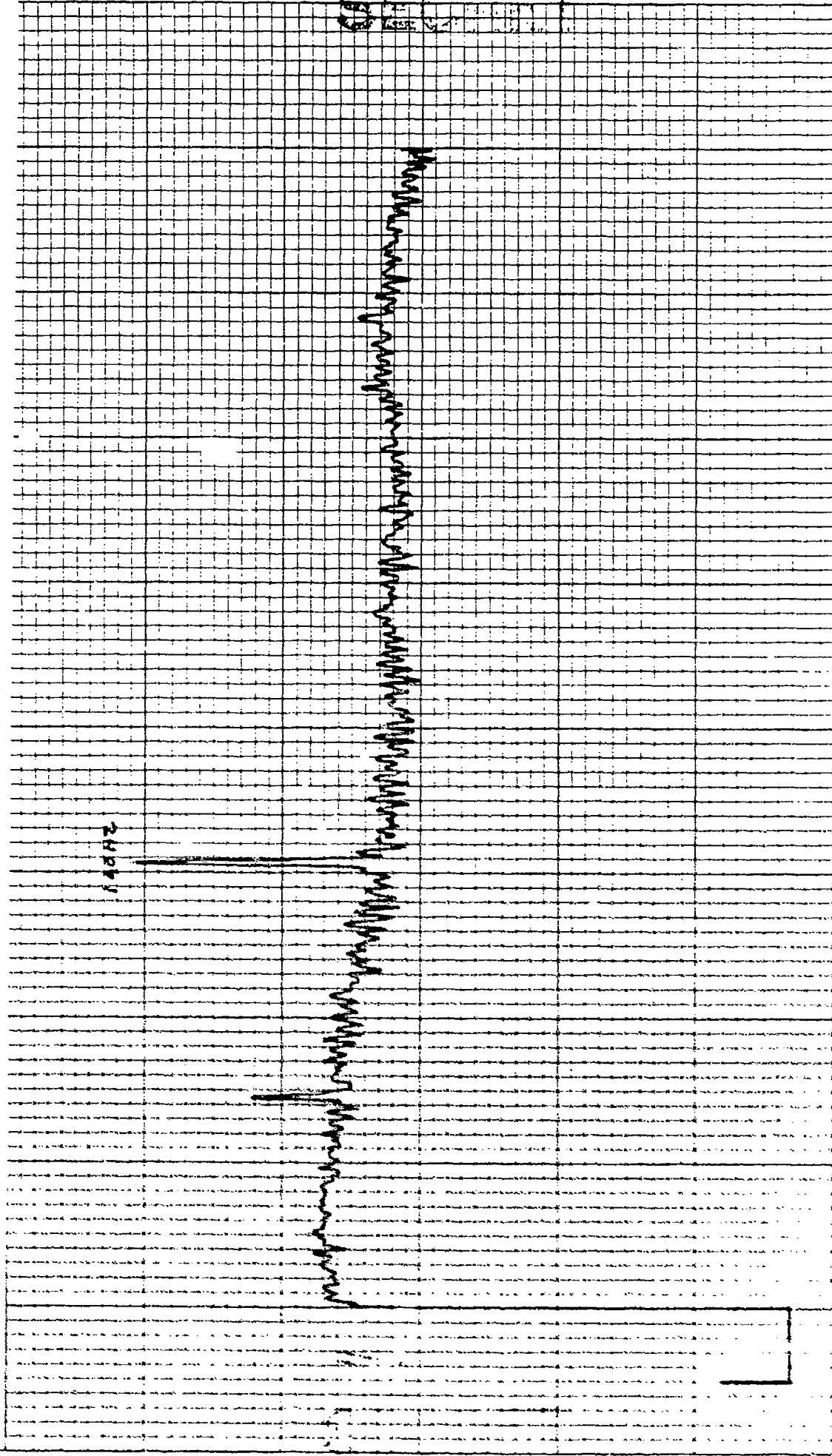
10 X 12 TO THE INCH = 1 X 10 INCHES
K&S MEMPHIS & K&S CO. MADE IN U.S.A.

46 0703

CONTROL: 0935 - 16 (DP11)
BEAMFORMED SPECTRUM (ELEMENTS)
EXERCISE: BEARING STAKE
CENTER FREQ: 150 HZ
16 ELEMENTS

DATE OF ANALYSIS: 1-16)
DATE/TIME: 3-16-77 - 0935 Z
ANALYSIS BANDWIDTH: 1/10 HZ
+ 48 DEG. AZ STEERING

REEL: M22
INTEGRATION TIME 320 SECS
FILTER WTG: HANNING
INDE X 566



10 X 10 TO THE INCHES 3 TO 200 HZ
REINTEL & ESSER CO. MADE IN U.S.A.

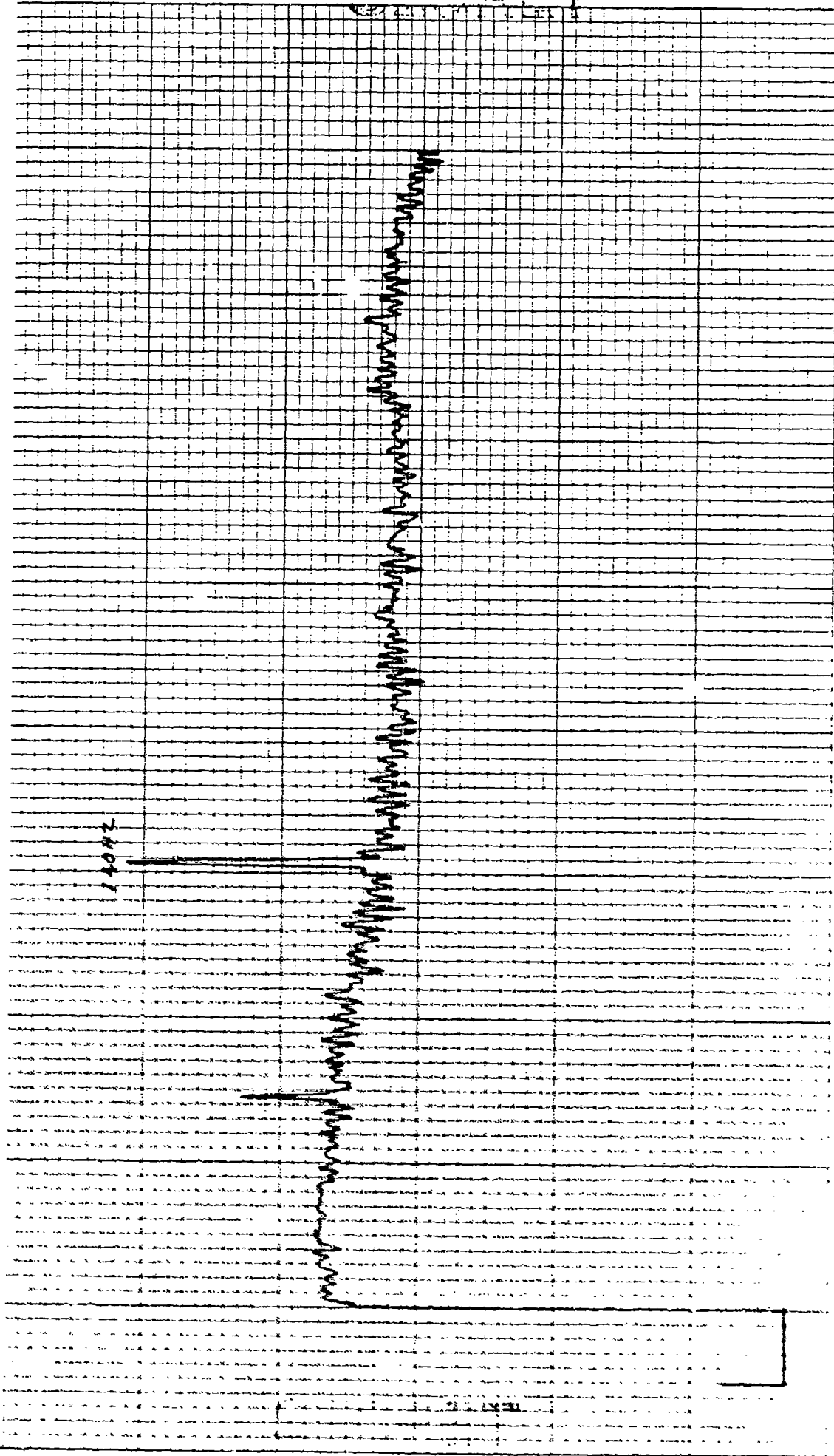
46 0703

CONTROL: 0935 - 16 (2011)
BEAMFORMED SPECTRUM (ELEMENTS)
EXERCISE: BEARING STAKE
CENTER FREQ: 150 HZ
16 ELEMENTS

DATE OF ANALYSIS: 1-16
DATE/TIME: 3-16-77 - 0935 Z
ANALYSIS BANDWIDTH: 1/10 HZ
400 DEG. AZ STEERING

REEL: H22
INDE X566

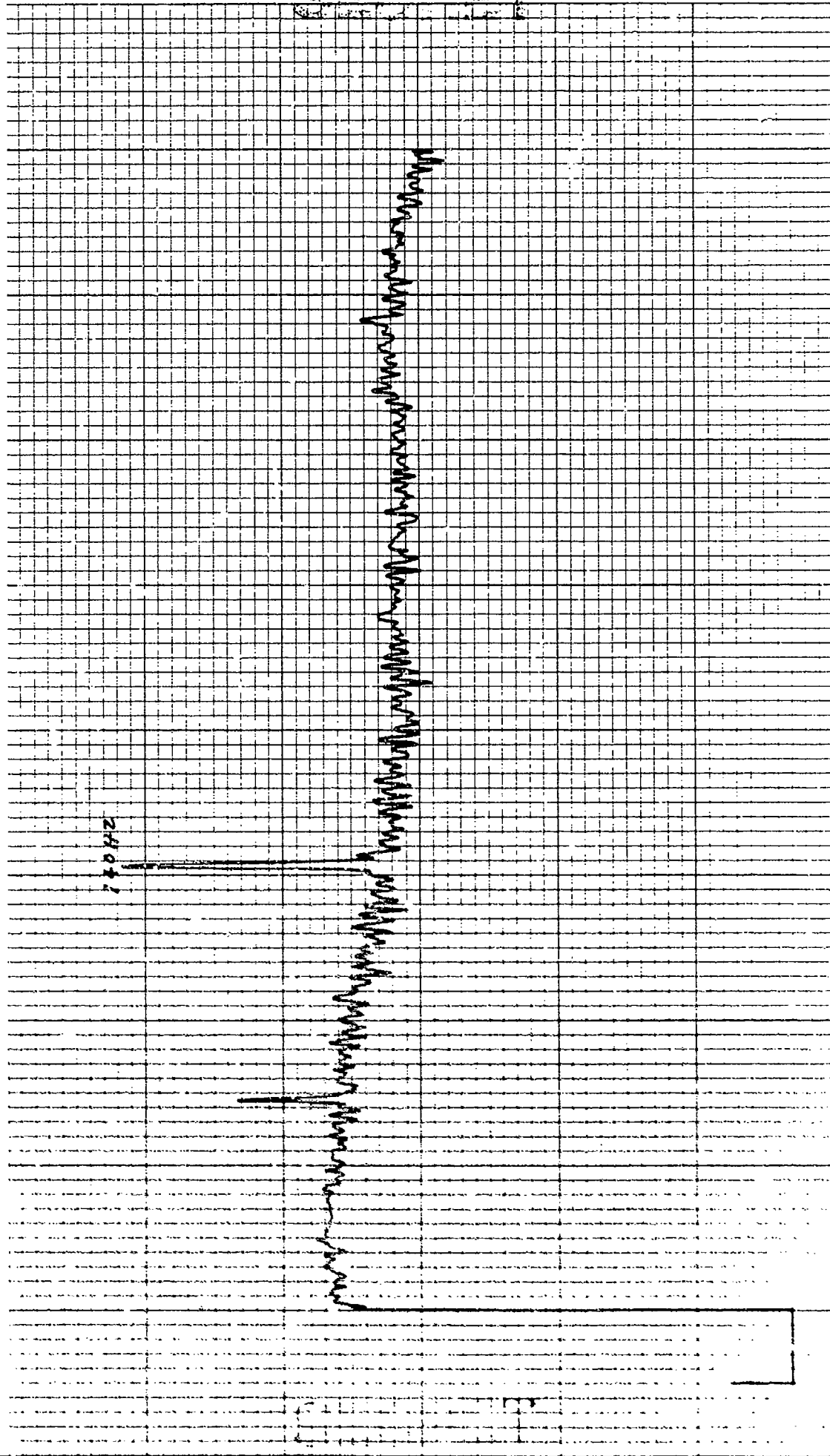
INTEGRATION TIME 320 SECS
ATTEN: 70 DB
FILTER
WTG: HANNING



CONTROL: 0935 - 16 (2011)
BEAMFORMED SPECTRUM (ELEMENTS)
EXERCISE: BEARING STAKE
CENTER FREQ: 150 HZ
16 ELEMENTS

DATE OF ANALYSIS: 1-16
DATE/TIME: 3-16-77 - 0935 Z
ANALYSIS BANDWIDTH: 1/10 HZ
+52 DEG. AZ STEERING

REEL: M22
INTEGRATION TIME 320 SECS
FILTER WTG: HANNING
ATTEN: -10 DB
INDEX 566



14.5 10 X 10 TO THE INCH • 7 X 10 1" CHES
NEUTREL & E-SFR CO. MADE IN U.S.A.

46 0703

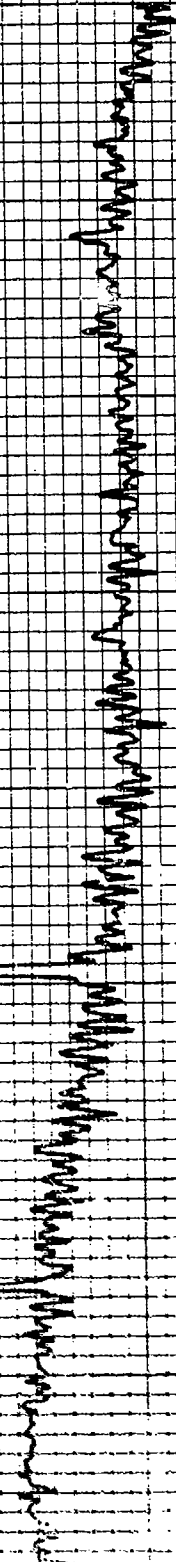
CONTROL: 0935 - 16 (PPI)
BEAMFORMED SPECTRUM (ELEMENTS)
EXERCISE: BEARING STAKE
CENTER FREQ: 150 HZ
16 ELEMENTS

DATE OF ANALYSIS: 1-16
DATE/TIME: 3-16-77 - 0935 Z
ANALYSIS BANDWIDTH: 1/10 HZ
+ 54 DEG. AZ STEERING

REEL: 122
INTEGRATION TIME 320 SECS
FILTER
WTG: HANNING

INDE X 1637
ATTN: -/0 DB

120 HZ



10 X 10 TO THE INCHES
KEUFEL & ESSER CO. MADE IN U.S.A.

46 0703

CONTROL: 0935 - 16 (DEU)
BEAMFORMED SPECTRUM (ELEMENTS)
EXERCISE: BEARING STAKE
CENTER FREQ: 150 HZ
16 ELEMENTS

DATE OF ANALYSIS: 1-16
DATE/TIME: 3-16-77 - 0935Z
ANALYSIS BANDWIDTH: 1/10HZ
+56 DEG. AZ STEERING

REEL: M22
INTEGRATION TIME 320 SECS
FILTER

INDE X566
ATTEN: -18 DB
WTG: HANNING

150 HZ

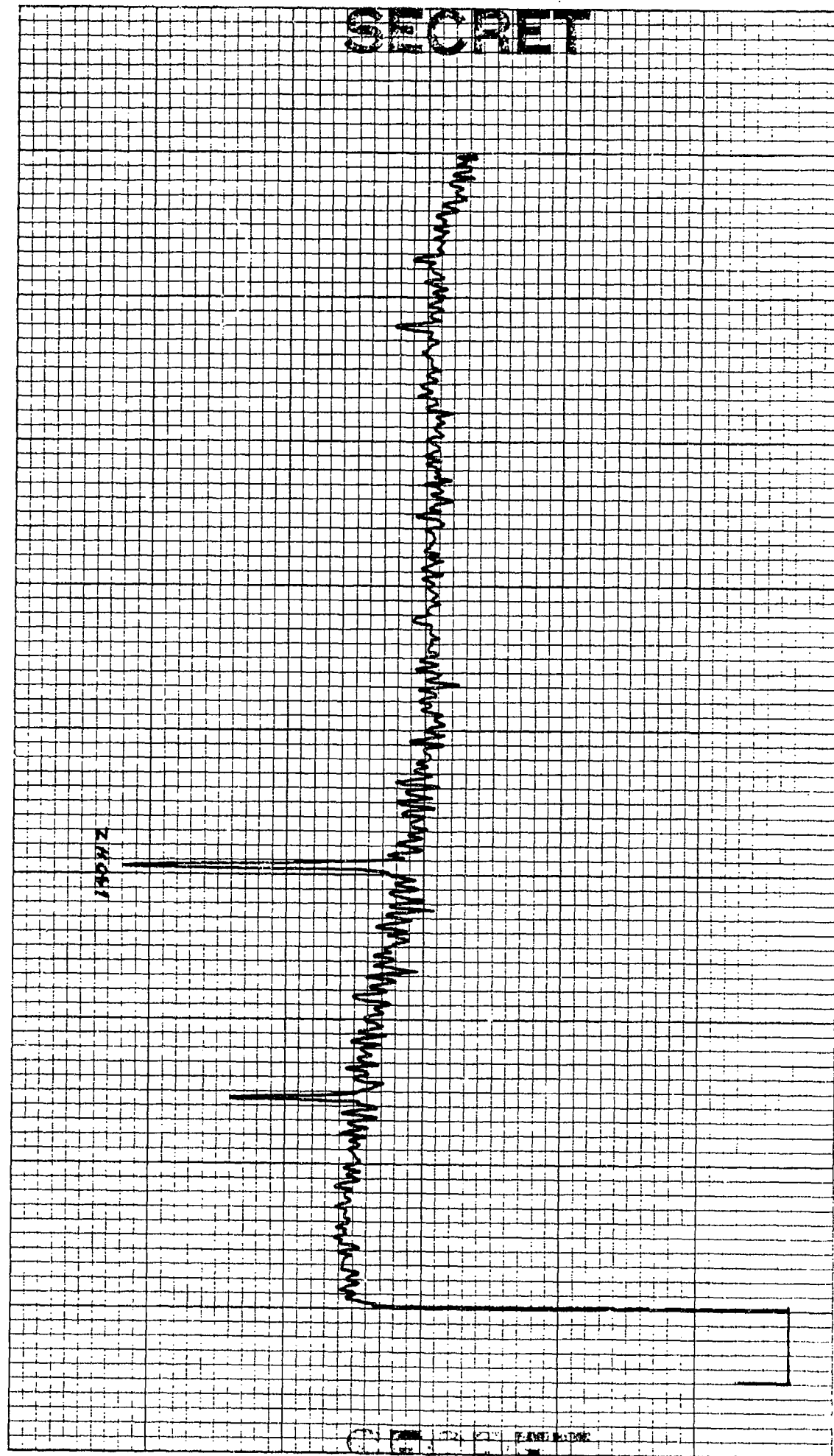
0935
150 HZ
16 ELEMENTS
1/10 HZ BANDWIDTH
1/10 HZ BANDWIDTH
1/10 HZ BANDWIDTH

Handwritten notes and scribbles across the grid, including a large 'X' and various illegible markings.

K-2 10 X 10 TO THE INCH • 7 X 10 INCHES
KEUFFEL & ESSER CO. MADE IN U.S.A.

46 0703

CONTROL: 0935 - 51 (DPH) REEL: M22 INDE X566
BEAMFORMED SPECTRUM (ELEMENTS) DATE OF ANALYSIS: _____
EXERCISE: BEARING STAKE DATE/TIME: 2-16-77 - 0935Z INTEGRATION TIME 320 SECS ATTN: 18 DB
CENTER FREQ: 150 HZ ANALYSIS BANDWIDTH: 1/10 HZ FILTER WTG: HANNING
16 ELEMENTS +50 DEG. AZ STEERING



K-E 10 X 10 TO THE INCH • 7 X 10 INCHES
KEUFFEL & ESSER CO. MADE IN U.S.A.

46 0703

CONTROL: 0935 - 16 (D011)
BEAMFORMED SPECTRUM (ELEMENTS)
EXERCISE: BEARING STAKE
CENTER FREQ: 150 HZ
16 ELEMENTS

DATE OF ANALYSIS: 1-16
DATE/TIME: 3-16-77 - 0935 Z
ANALYSIS BANDWIDTH: 1/10 HZ
160 DEG. AZ STEERING

REEL: 122
INTEGRATION TIME 320 SECS
FILTER

INDE X566
ATTEN: -10 DB
WTG: HANNING

14042

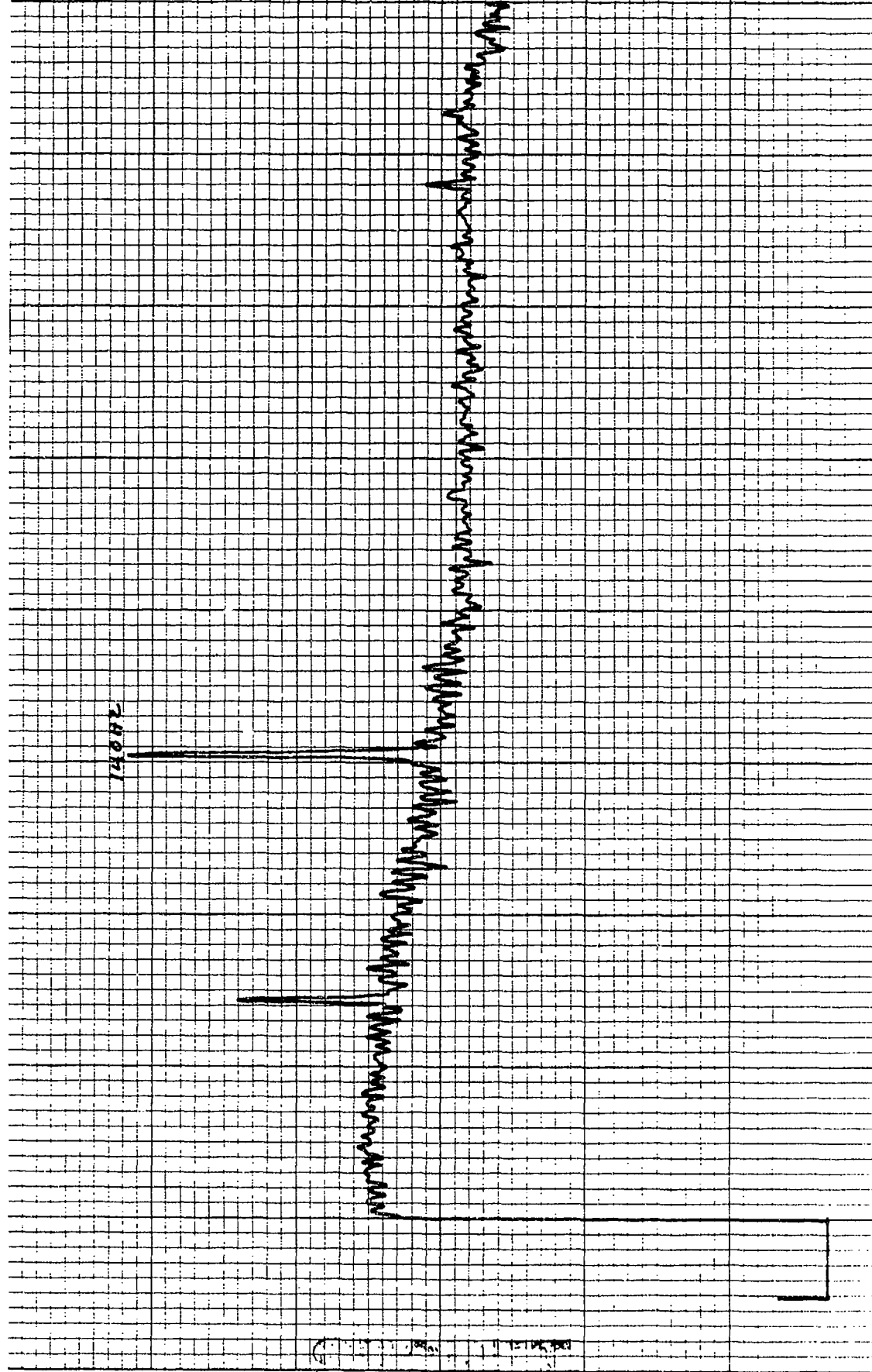
SECRET

SECRET

K-2 10 X 10 TO THE INCH • 7 X 10 INCHES
KEUFFEL & ESSER CO. MADE IN U.S.A.

46 0703

CONTROL: 0835 - 16 (2011) DATE OF ANALYSIS: 1-16 REEL: 122 INDEX: X 566
BEAMFORMED SPECTRUM (ELEMENTS) 1-16
EXERCISE: BEARING STAKE
CENTER FREQ: 150 HZ
16 ELEMENTS
INTEGRATION TIME 320 SECS ATTN: -10 DB
FILTER WTG: HANNING
ANALYSIS BANDWIDTH: 1/10 HZ
+62 DEG. AZ STEERING



SECRET

KSE 10 X 10 TO THE INCH • 7 X 10 INCHES
KEUFFEL & ESSER CO. MADE IN U.S.A.

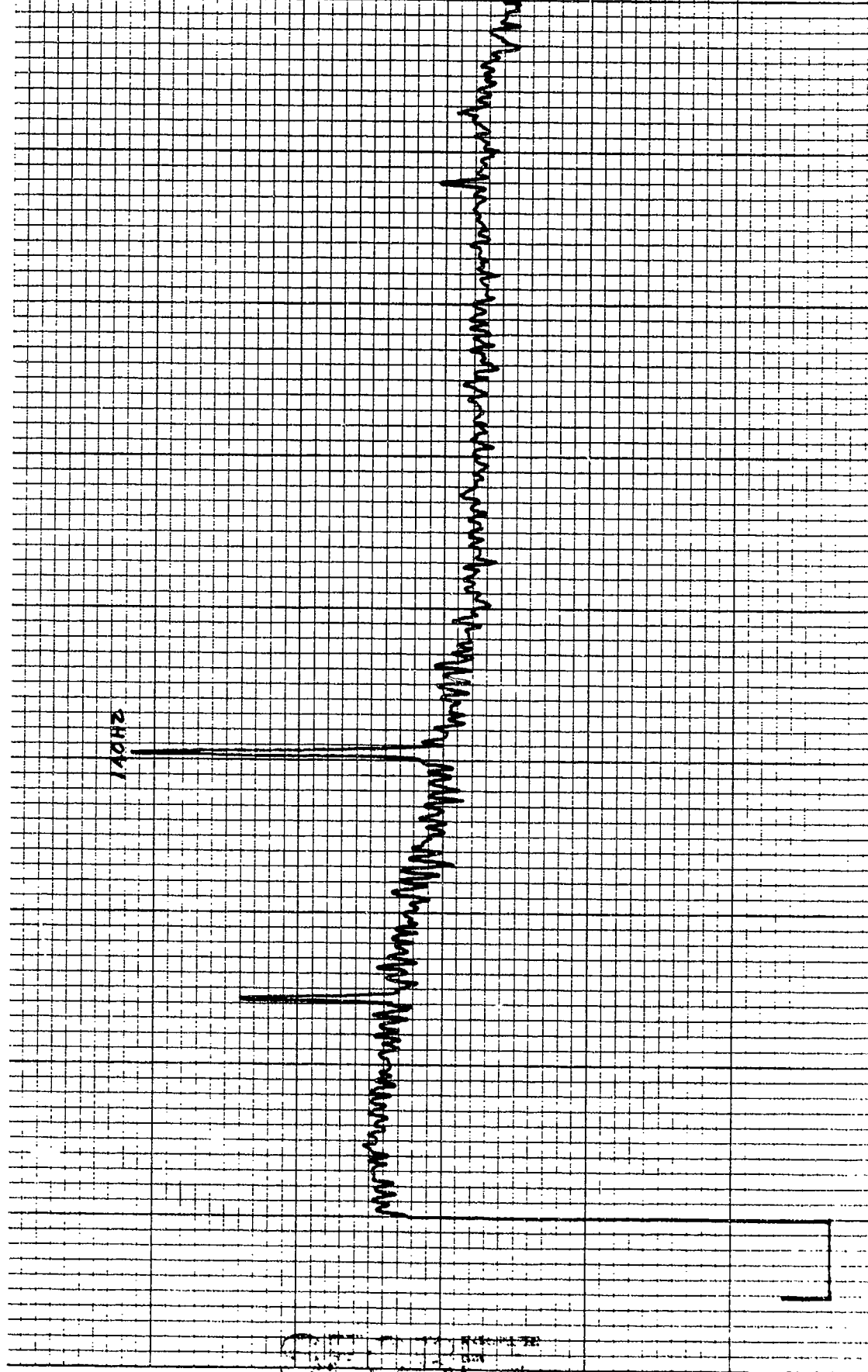
46 0703

CONTROL: 0935-16 (DRI)
BEAMFORMED SPECTRUM (ELEMENTS)
EXERCISE: BEARING STAKE
CENTER FREQ: 150 HZ
16 ELEMENTS

DATE OF ANALYSIS: 1-16
DATE/TIME: 3-16-77-0935Z
ANALYSIS BANDWIDTH: 1/10HZ
+64 DEG. AZ STEERING

REEL: 1122
INTEGRATION TIME 320 SECS
FILTER
WTG: HANNING

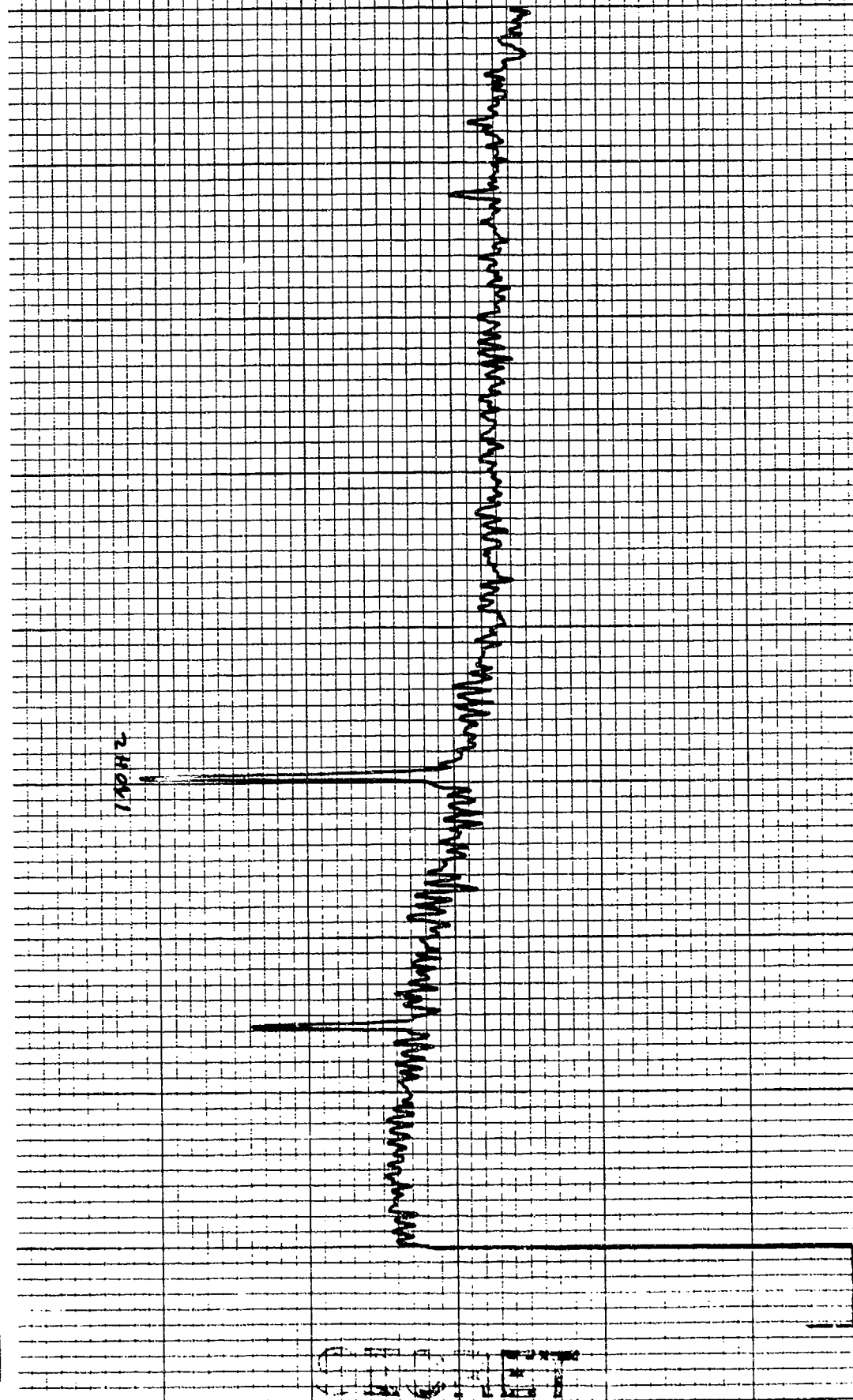
INDE X 566
ATTEN: 40 DB



46 0703

REEL: 422 INDEX X 566
INTEGRATION TIME 320 SECS ATTN: -10 DB
FILTER WTG: HANNING

DATE OF ANALYSIS: 1-16)
DATE/TIME: 3-16-77 - 0935 Z
ANALYSIS BANDWIDTH: 1/10HZ
+66 DEG. AZ STEERING



10 X 10 TO THE INCH 4.7 X 10 INCHES
KEUFFEL & ESSER CO. MADE IN U.S.A.

46 0703

INDE X 566

REEL: M77

ATTEN: -/0 DB
WTG: HANNING

INTEGRATION TIME 320 SECS
FILTER

DATE OF ANALYSIS: - - - - -
1-16

DATE/TIME: 7-16-77 - 0035Z

ANALYSIS BANDWIDTH: 1/10HZ

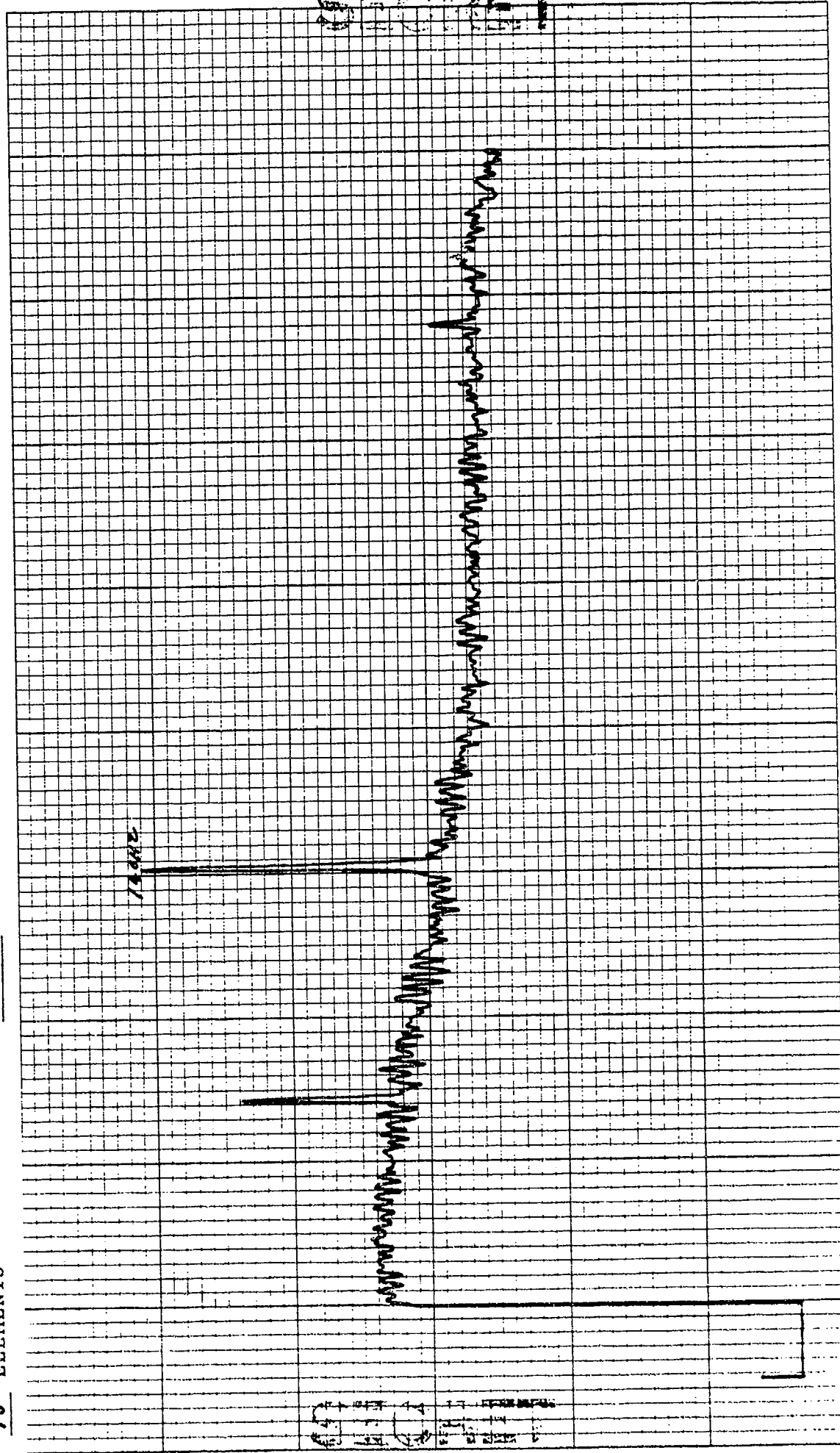
+10 DEG. AZ STEERING

CONTROL: 0035 - 16 (DRII)
BEAMFORMED SPECTRUM (ELEMENTS)

EXERCISE: BEARING STAKE

CENTER FREQ: 150 HZ

16 ELEMENTS



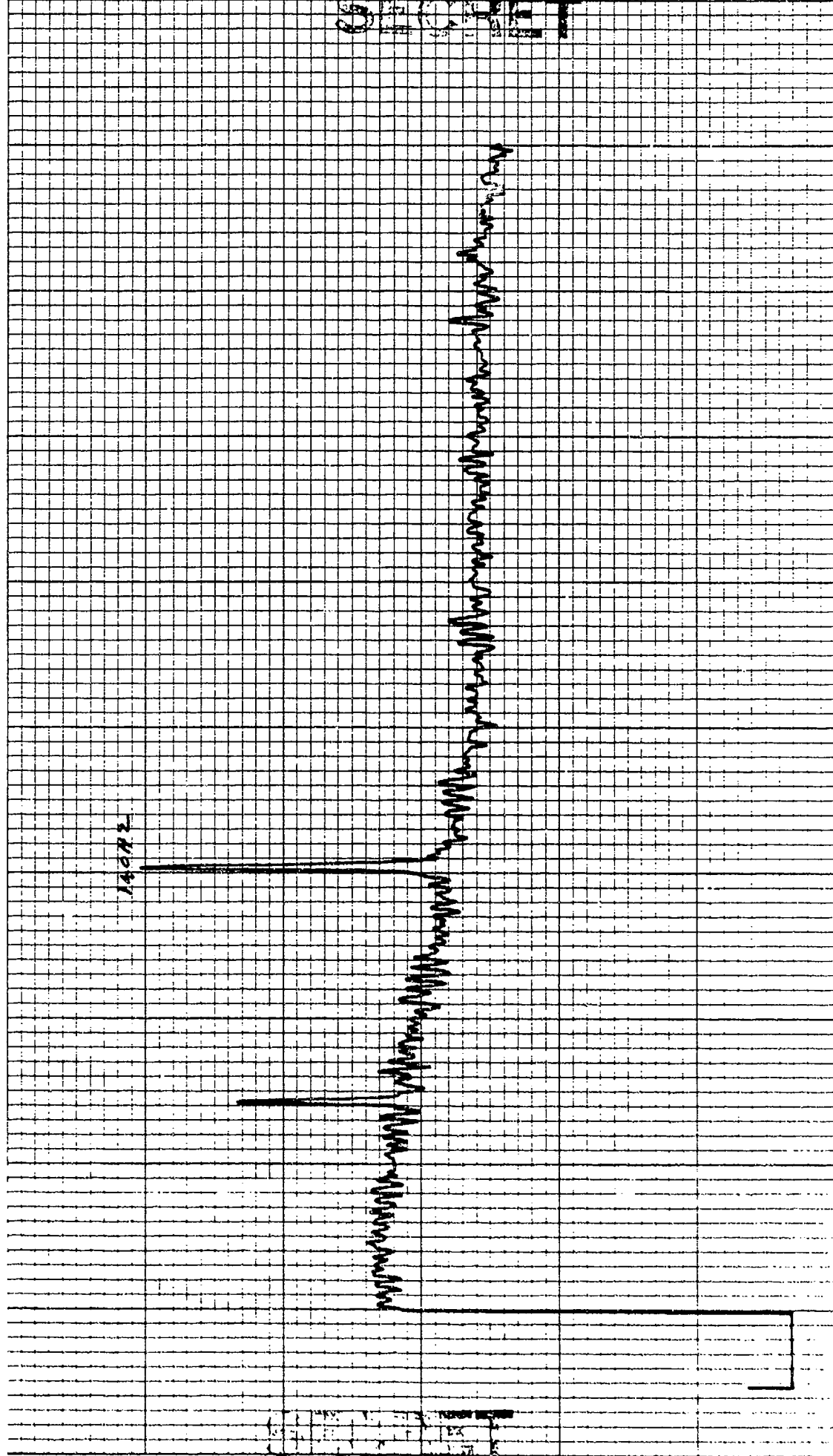
46 0703

CONTROL: 0935 - 16 (DP11)
BEAMFORMED SPECTRUM(ELEMENTS
EXERCISE: BEARING STAKE
CENTER FREQ: 150 HZ
16 ELEMENTS

DATE OF ANALYSIS: 1-16)
DATE/TIME: 3-16-77 - 0055Z
ANALYSIS BANDWIDTH: 1/10HZ
+70 DEG. AZ STEERING

REEL: 1422
INTEGRATION TIME 320 SECS
FILTER

INDEX X 526
ATTN: 78 DB
WTG: HANNING



SECRET

KSE 10 X 10 TO THE INCH 7 X 10 INCHES
KEUFFEL & ESSER CO. MADE IN U.S.A.

46 0703

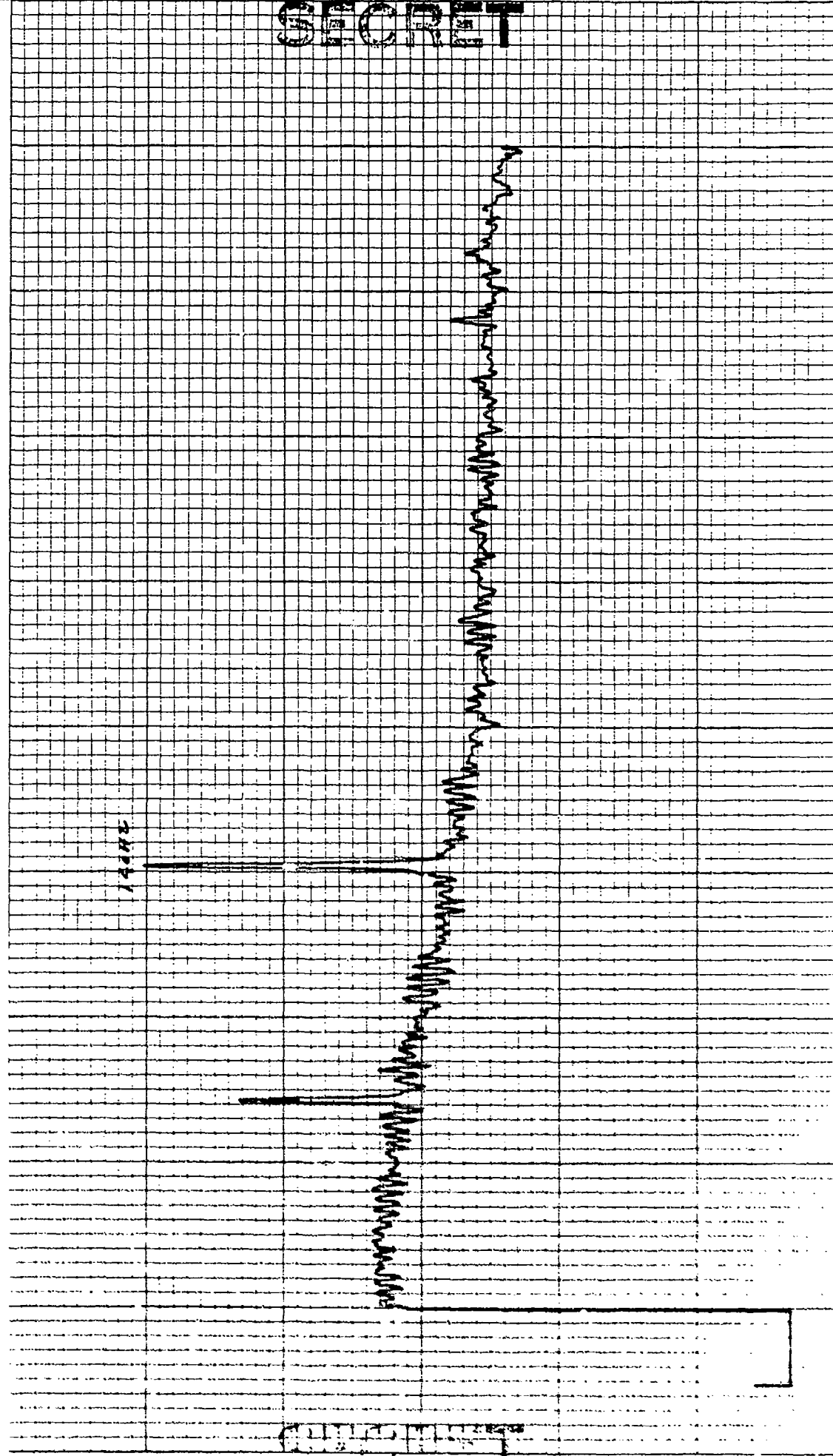
CONTROL: 0935 - 16 (DP11)
BEAMFORMED SPECTRUM (ELEMENTS)
EXERCISE: BEARING STAKE
CENTER FREQ: 150 HZ
16 ELEMENTS

DATE OF ANALYSIS: 1-16)
DATE/TIME: 3-16-77 - 0935 Z
ANALYSIS BANDWIDTH: 1/10 HZ
+72 DEG. AZ STEERING

REEL: 422

INDE X 566

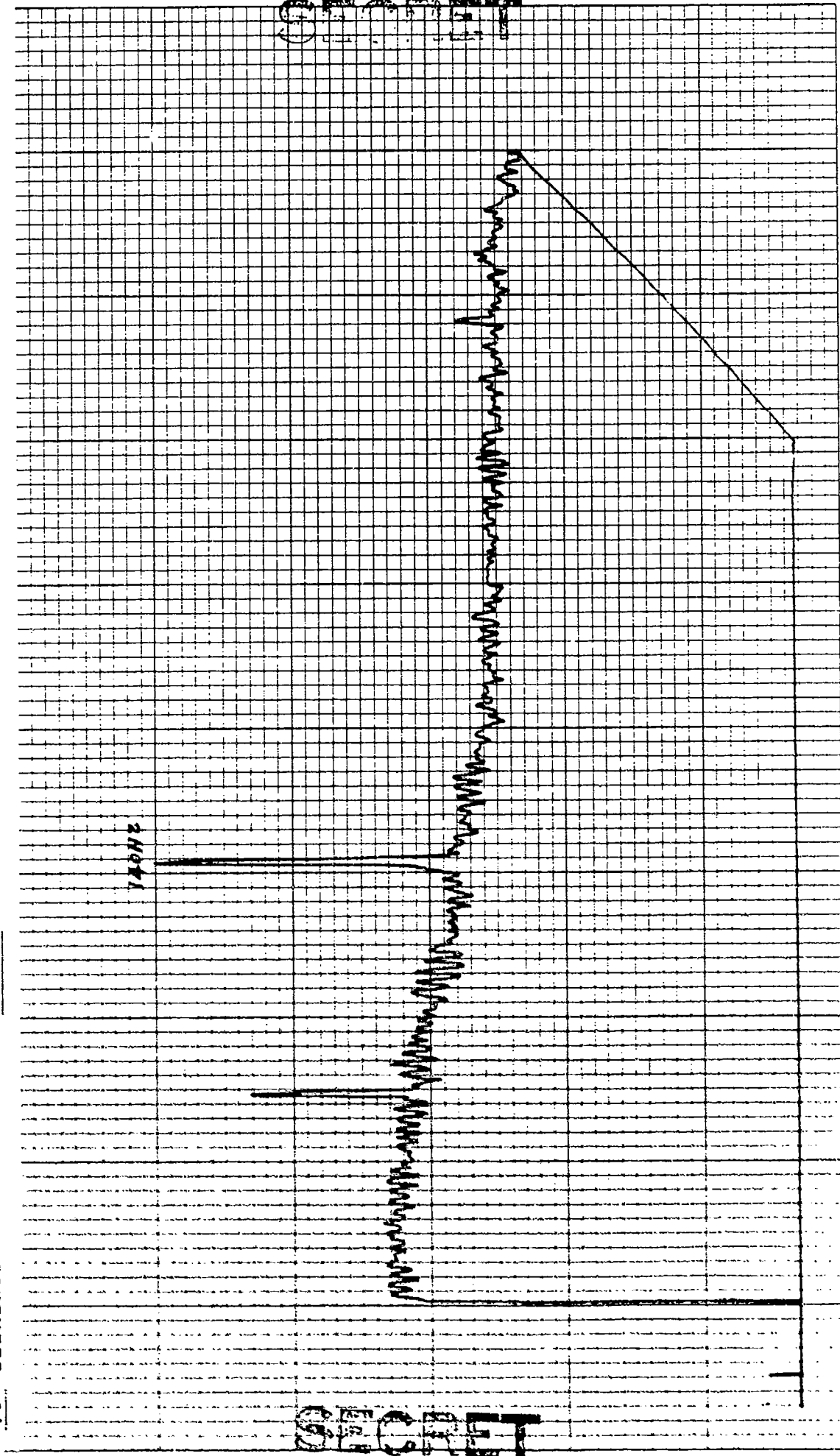
INTEGRATION TIME 320 SECS
ATTEN: -10 DB
FILTER WTG: HANNING



180E 10 X 10 TO THE INCH • 2 X 10 INCHES
HUPPIL & LESSER CO. MAINTENANCE

46 0703

CONTROL: 0835 - 16 (DPH) REEL: H22 INDEX X 566
BEAMFORMED SPECTRUM (ELEMENTS) INTEGRATION TIME 320 SECS ATTN: -10 DB
EXERCISE: BEARING STAKE FILTER WTG: HANNING
CENTER FREQ: 150 HZ
16 ELEMENTS
DATE OF ANALYSIS: 1-16
DATE/TIME: 3-16-77 - 0835 Z
ANALYSIS BANDWIDTH: 1/10 HZ
+ 74 DEG. AZ STEERING



KOE 10 X 10 TO THE INCHES
NEUPTEL & FESSEN CO. MADE IN U.S.A.

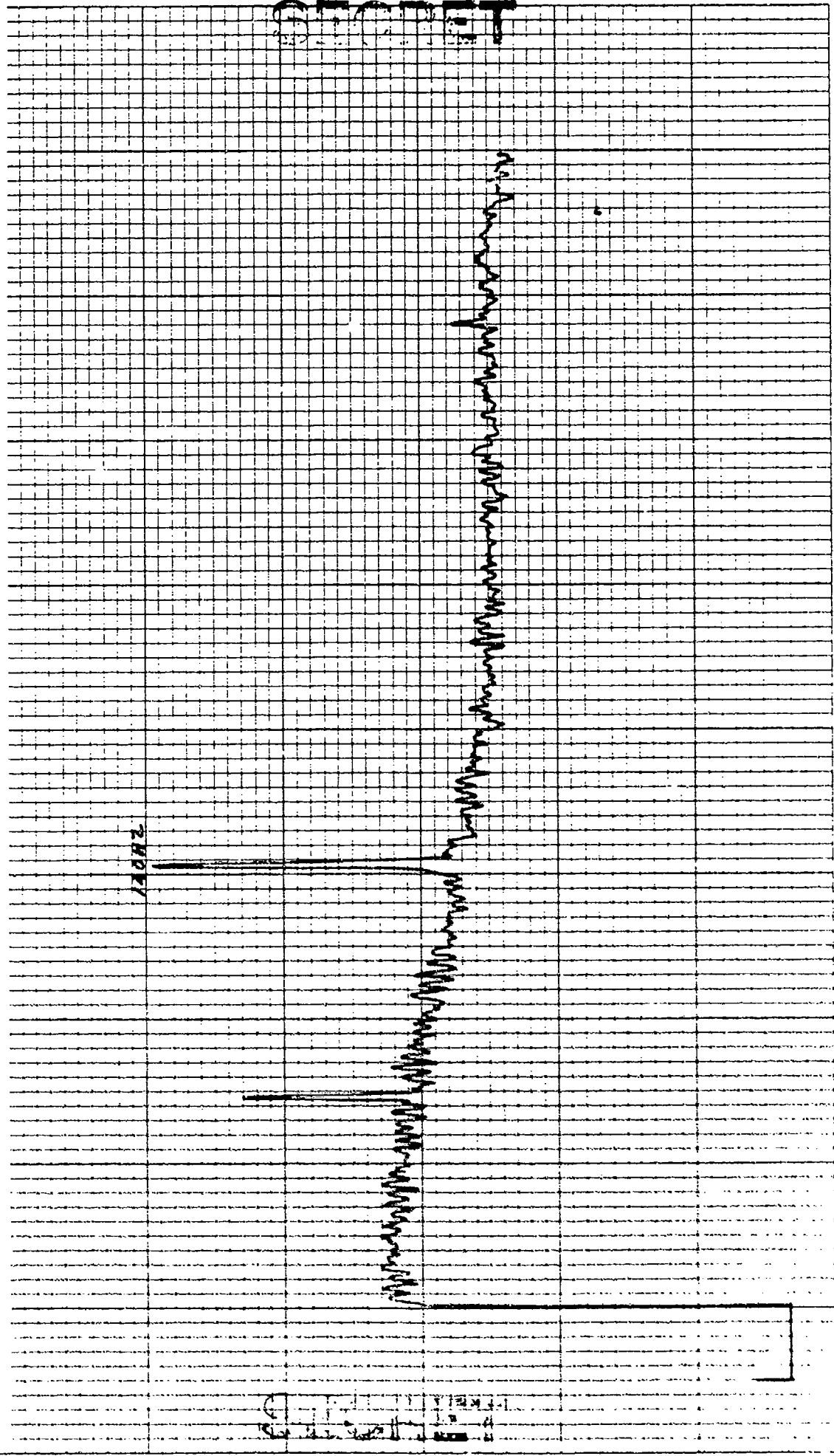
46 0703

CONTROL: 0935 - 16 (DP11)
BEAMFORMED SPECTRUM (ELEMENTS)
EXERCISE: BEARING STAKE
CENTER FREQ: 150 HZ
16 ELEMENTS

DATE OF ANALYSIS: 1-16
DATE/TIME: 3-16-77 - 0935 Z
ANALYSIS BANDWIDTH: 1/10 HZ
+76 DEG. AZ STEERING

REEL: 1102
INTEGRATION TIME 320 SECS
FILTER

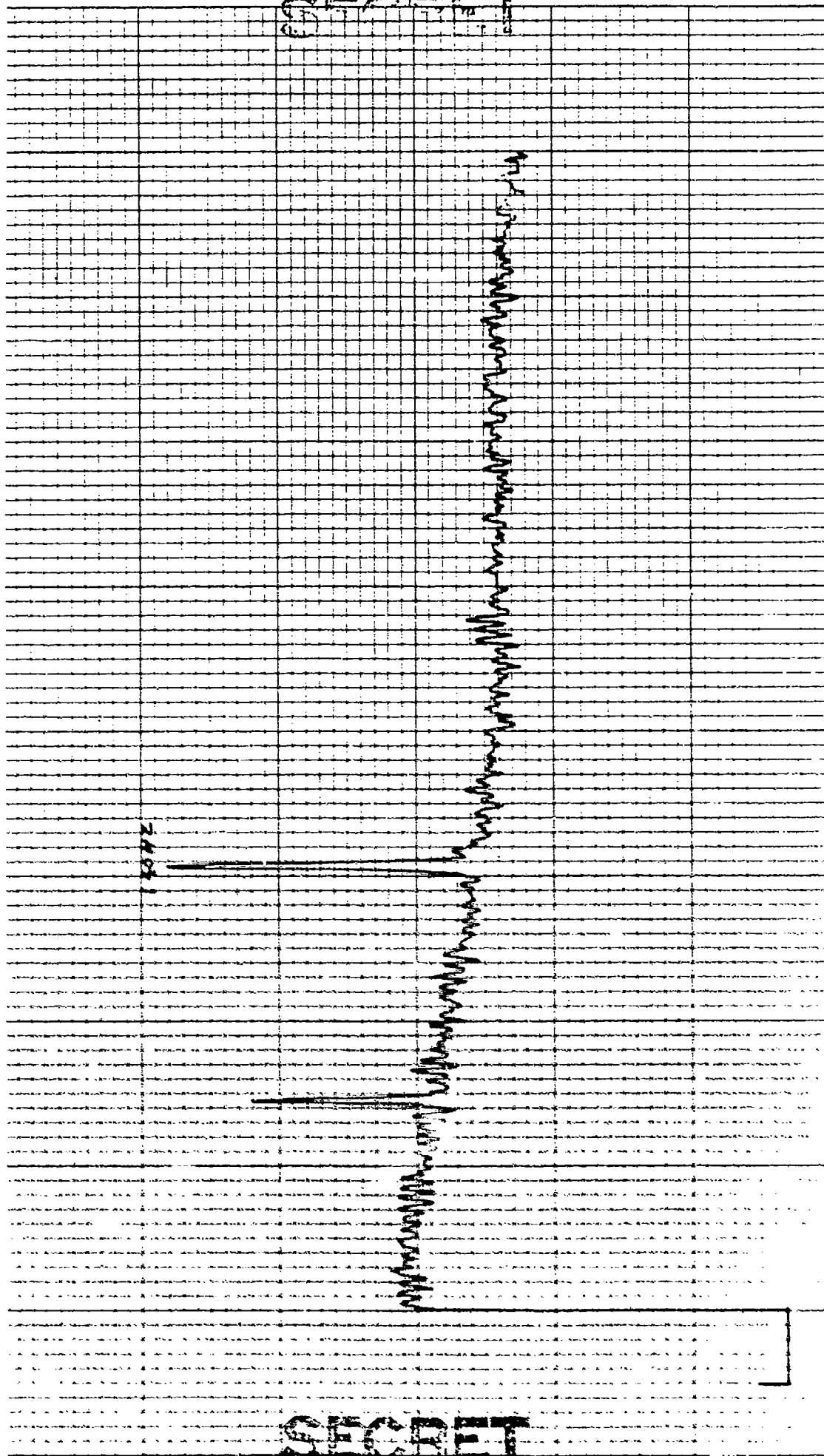
INDE X 566
ATTEN: -70 DB
WTG: HANNING



K-E 10 X 10 TO THE INCH = 2 X 10 INCHES
REPRODUCED BY FORN CO. MADE IN U.S.A.

46 0703

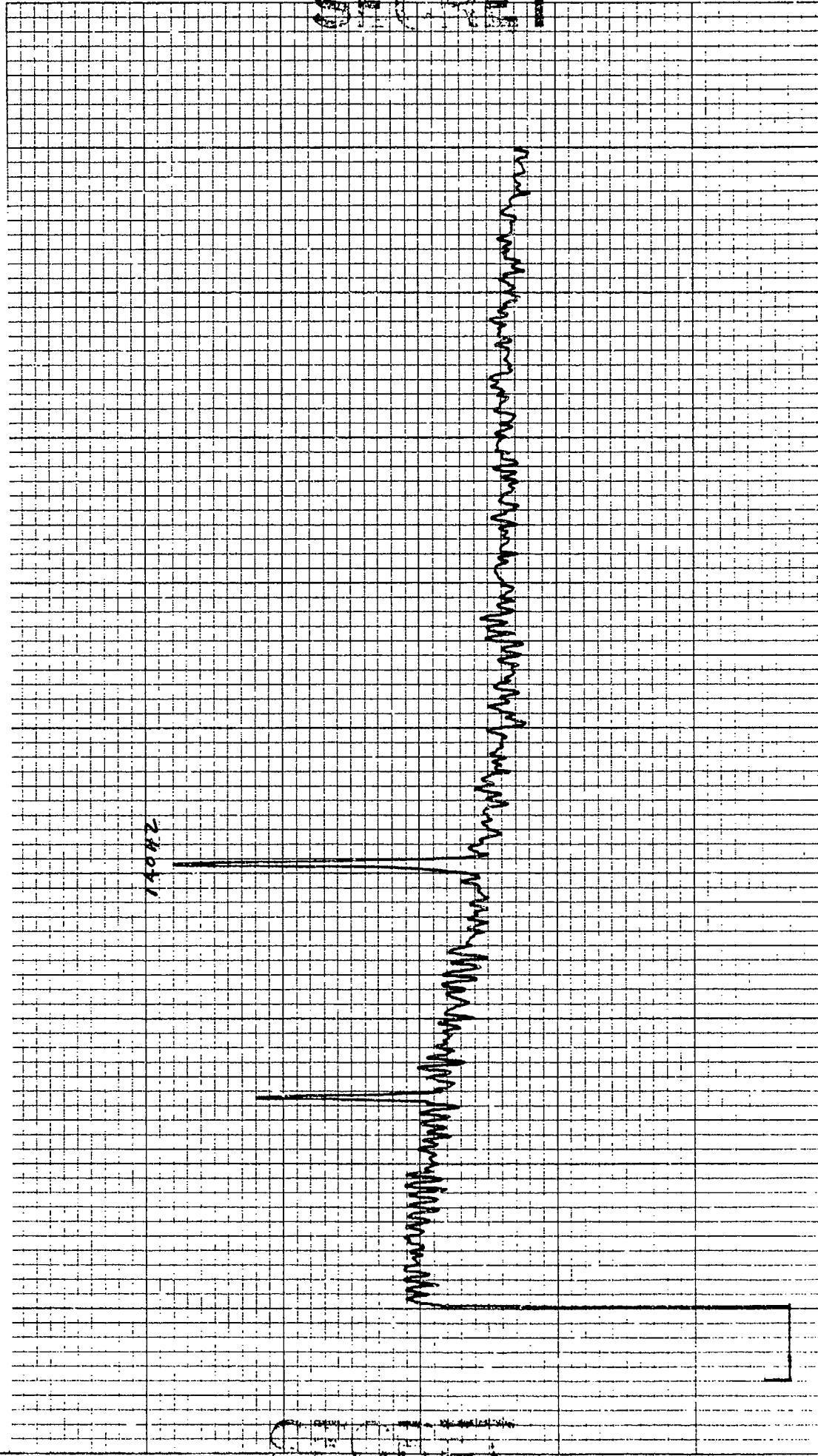
CONTROL: 0935 - 16 (DPJL) REEL: A-1 INDE X 526
DEANFORMED SPECTRUM(ELEMENTS) INTEGRATION TIME 320 SECS ATTN: -/0 DB
EXERCISE: BEARING STAKE FILTER WTC: HANNING
CENTER FREQ: 150 HZ
16 ELEMENTS
DATE OF ANALYSIS: 1-16
DATE/TIME: 3-16-77 - 0935Z
ANALYSIS BANDWIDTH: 1/10HZ
+ 70 DEG. AZ STEERING



K&E 10 X 10 TO THE INCH • 7 X 10 INCHES
NEUTFEL & ESSER CO. MADE IN U.S.A.

46 0703

CONTROL: 0935 - 16 (bpi) REEL: M22 INDEX X 566
BEAMFORMED SPECTRUM (ELEMENTS)
EXERCISE: BEARING STAKE
CENTER FREQ: 150 HZ
16 ELEMENTS
DATE OF ANALYSIS: 1-16
DATE/TIME: 3-16-77 - 0935Z
ANALYSIS BANDWIDTH: 1/10HZ
+90 DEG. AZ STEERING
INTEGRATION TIME 320 SECS
FILTER WTG: HANNING
ATTEN: -10 DB



K&E 10 X 10 TO THE INCH • 7 X 10 INCHES
KEUFTEL & ESSER CO. MADE IN U.S.A.

46 0703

CONTROL: 0935-16 (D011)
BEAMFORMED SPECTRUM(ELEMENTS
EXERCISE: BEARING STAKE
CENTER FREQ: 270 HZ
16 ELEMENTS

DATE OF ANALYSIS: - - - - -
1-16
DATE/TIME: 3-16-77 - 0935 Z
ANALYSIS BANDWIDTH: 1/10 HZ
+50 DEG. AZ STEERING

REEL: 422 INDE X566
INTEGRATION TIME 320 SECS ATTN: -10 DB
FILTER WTG: HANNING

REEL 422

SECRET

KE 10 X 10 TO THE INCH • 7 X 10 INCHES
KEUFFEL & ESSER CO. MADE IN U.S.A.

46 0703

CONTROL: 0935 - 16 (DP11)
BEAMFORMED SPECTRUM (ELEMENTS)
EXERCISE: BEARING STAKE
CENTER FREQ: 270 HZ
16 ELEMENTS

DATE OF ANALYSIS: 1-16
DATE/TIME: 3-16-77 - 0935 Z
ANALYSIS BANDWIDTH: 1/10 HZ
+52 DEG. AZ STEERING

REEL: M22
INTEGRATION TIME 320 SECS
FILTER
WTG: HANNING

INDE X 566

ATTEN: 76 DB
WGTG: HANNING

200000

Handwritten notes on graph paper, including a large 'L' shape and various scribbles.

K.E 10 X 10 TO THE INCH • 7 X 10 INCHES
KEUFFEL & ESSER CO. MADE IN U.S.A.

46 0703

CONTROL: 0935 - 16 (DP11)
BEAMFORMED SPECTRUM (ELEMENTS)
EXERCISE: BEARING STAKE
CENTER FREQ: 270 HZ
16 ELEMENTS

DATE OF ANALYSIS: 1-16

DATE/TIME: 3-16-77-0935Z
ANALYSIS BANDWIDTH: 1/10HZ
-54 DEG. AZ STEERING

REEL: 422

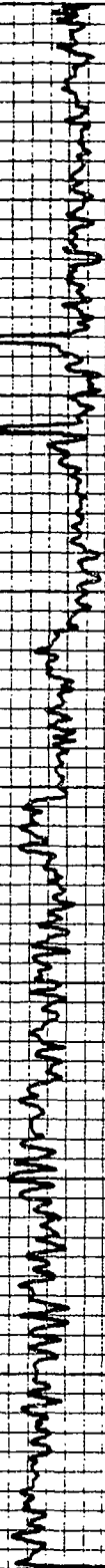
INTEGRATION TIME 320 SECS
FILTER

INDE X 526

ATTEN: 70 DB
WTG: HANNING

SECRET

250 Hz



SECRET

KSE 10 X 10 TO THE INCH • 7 X 10 INCHES
KEUFFEL & ESSER CO. MADE IN U.S.A.

46 0703

CONTROL: 0935-16 (DPH)
BEAMFORMED SPECTRUM (ELEMENTS)
EXERCISE: BEARING STAKE
CENTER FREQ: 370 HZ
16 ELEMENTS

DATE OF ANALYSIS: 1-16
DATE/TIME: 3-16-77-0935Z
ANALYSIS BANDWIDTH: 1/10 HZ
+56 DEG. AZ STEERING

REEL: 442
INTEGRATION TIME 320 SECS
FILTER

INDE X 566
ATTN: -10 DB
WTG: HANNING

SECRET

280002

SECRET

[Handwritten signature/initials across the grid]

K.E 10 X 10 TO THE INCH 7 X 10 INCHES
KEUFFEL & ESSER CO. MADE IN U.S.A

46 0703

CONTROL: 0935-16 (DPH)
BEAMFORMED SPECTRUM(ELEMENTS
EXERCISE: BEARING STAKE
CENTER FREQ: 270 HZ
16 ELEMENTS

DATE OF ANALYSIS: 1-16
DATE/TIME: 3-16-77 - 0935 Z
ANALYSIS BANDWIDTH: 1/10HZ
+ 50 DEG. AZ STEERING

REEL: A22
INTEGRATION TIME 320 SECS
FILTER
ATTEN: -10 DB
WTG: HANNING
INDE X 566

SECRET

11042

SECRET

Handwritten scribbles and markings across the grid.

10 X 10 TO THE INCH • 7 X 10 INCHES
KEUFFEL & ESSER CO. MADE IN U.S.A.

46 0703

CONTROL: 0935-16 (DPH) DATE OF ANALYSIS: 1-16 REEL: 422 INDE X 566
BEAMFORMED SPECTRUM(ELEMENTS)
EXERCISE: BEARING STAKE
CENTER FREQ: 270 HZ
16 ELEMENTS
INTEGRATION TIME 320 SECS ATTN: -18 DB
FILTER WTG: HANNING

DATE/TIME: 3-16-77 - 0935 Z
ANALYSIS BANDWIDTH: 1/10 HZ
+60 DEG. AZ STEERING

290 HZ

SECRET

46 0703

DATE OF ANALYSIS: 1-16)
DATE/TIME: 3-16-77 - 0835 Z
ANALYSIS BANDWIDTH: 1/10HZ
+ 62 DEG. AZ STEERING

REEL: 492 INDEX X 566
INTEGRATION TIME 320 SECS ATTN: -18 DB
FILTER WTC: HANNING

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
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2023

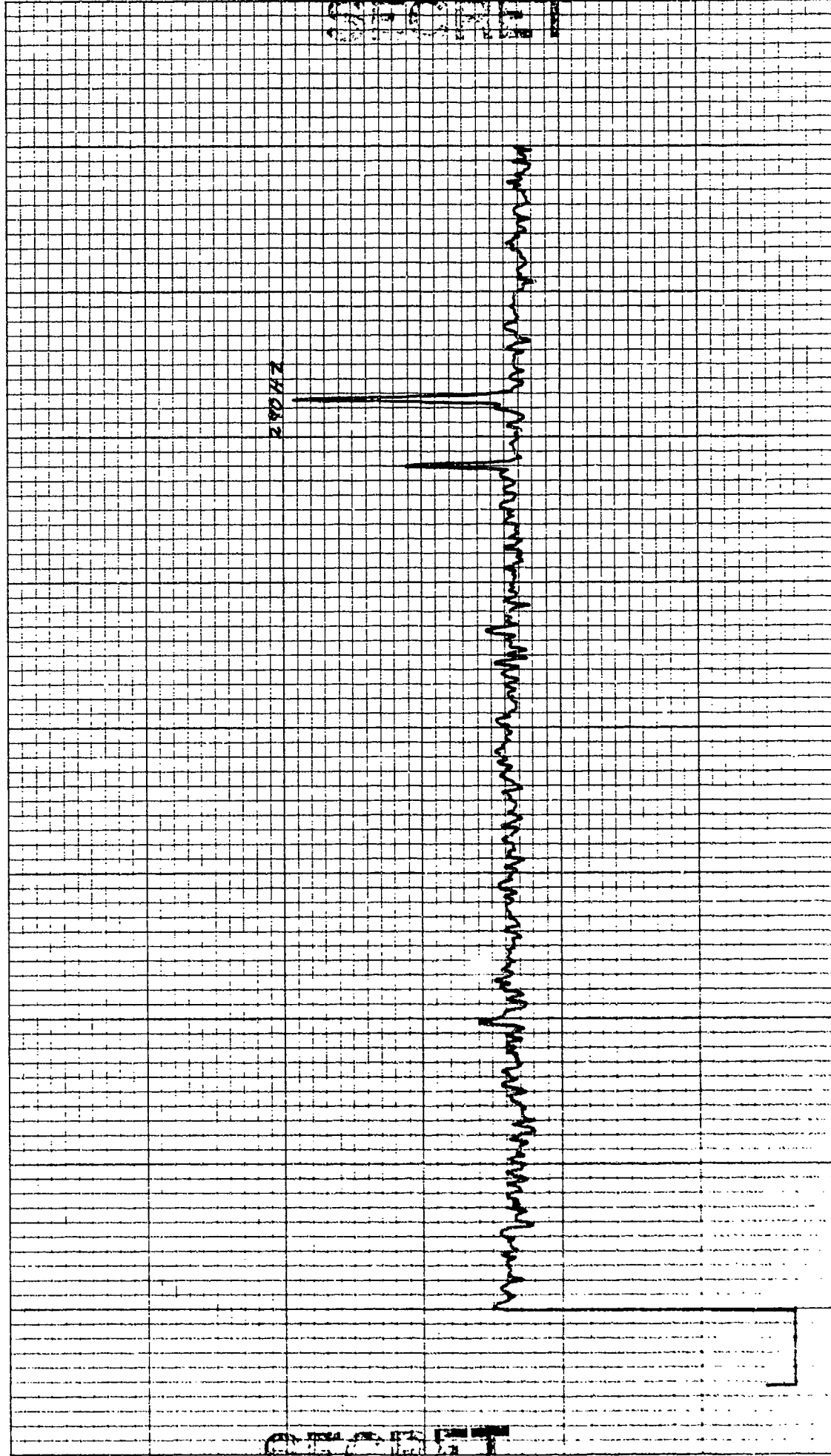
SECRET

1. What is the main purpose of the study?
 The study aims to investigate the effects of a new teaching method on student performance in mathematics.

10 X 10 TO THE INCH • 7 X 10 INCHES
KEUFFEL & ESSER CO. MADE IN U.S.A.

46 0703

CONTROL: 0935 - 51 (DP11) DATE OF ANALYSIS: 1-16 INDE X 566
BEAMFORMED SPECTRUM (ELEMENTS) REEL: 1222
EXERCISE: BEARING STAKE INTEGRATION TIME 320 SECS ATTN: 18 DB
CENTER FREQ: 270 HZ FILTER WTG: HANNING
16 ELEMENTS ANALYSIS BANDWIDTH: 1/10 HZ
+64 DEG. AZ STEERING



10 X 10 TO THE INCH • 7 X 10 INCHES
REDFIELD & FESSER CO. MADE IN U.S.A.

46 0703

CONTROL: 0835-16 (DPII)
BEAMFORMED SPECTRUM (ELEMENTS
EXERCISE: BEARING STAKE
CENTER FREQ: 270 HZ
16 ELEMENTS

DATE OF ANALYSIS: - - -
1-16
DATE/TIME: 3-6-77-0835 Z
ANALYSIS BANDWIDTH: 1/10 HZ
+66 DEG. AZ STEERING

REEL: M22 INDE X 566

INTEGRATION TIME 320 SECS
ATTEN: -18 DB
WTG: HANNING
FILTER

SECRET

240002

SECRET

Very poor quality of the original document. The text is mostly illegible due to the quality of the scan and the handwriting. The word "SECRET" is visible at the top and bottom of the page.

KOE 10 X 10 TO THE INCH • 7 X 10 INCHES
KEUFFEL & ESSER CO. MADE IN U.S.A.

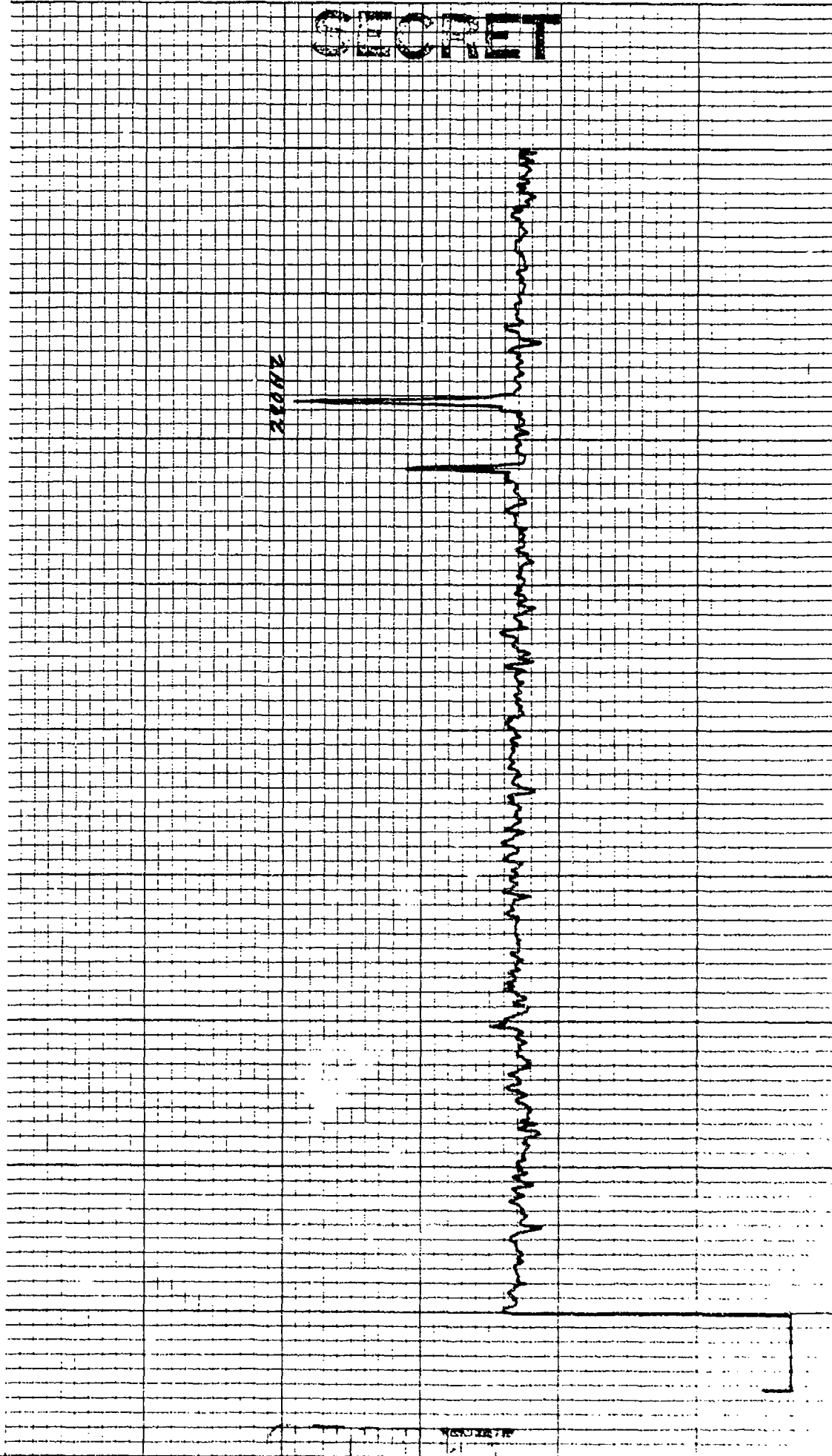
46 0703

CONTROL: 0935 - 16 (DP11)
BEAMFORMED SPECTRUM(ELEMENTS)
EXERCISE: BEARING STAKE
CENTER FREQ: 270 HZ
16 ELEMENTS

DATE OF ANALYSIS: 1-16
DATE/TIME: 3-16-77 - 0935 Z
ANALYSIS BANDWIDTH: 1/10 HZ
460 DEG. AZ STEERING

REEL: 111
INTEGRATION TIME 320 SECS
FILTER
WTG: HANNING

INDE X 566
ATTN: -18 DB



SECRET

10 X 10 TO THE INCHES 1/2 1/2 INCHES
PAPER, 6. CONFORM CO. MADE IN U.S.A.

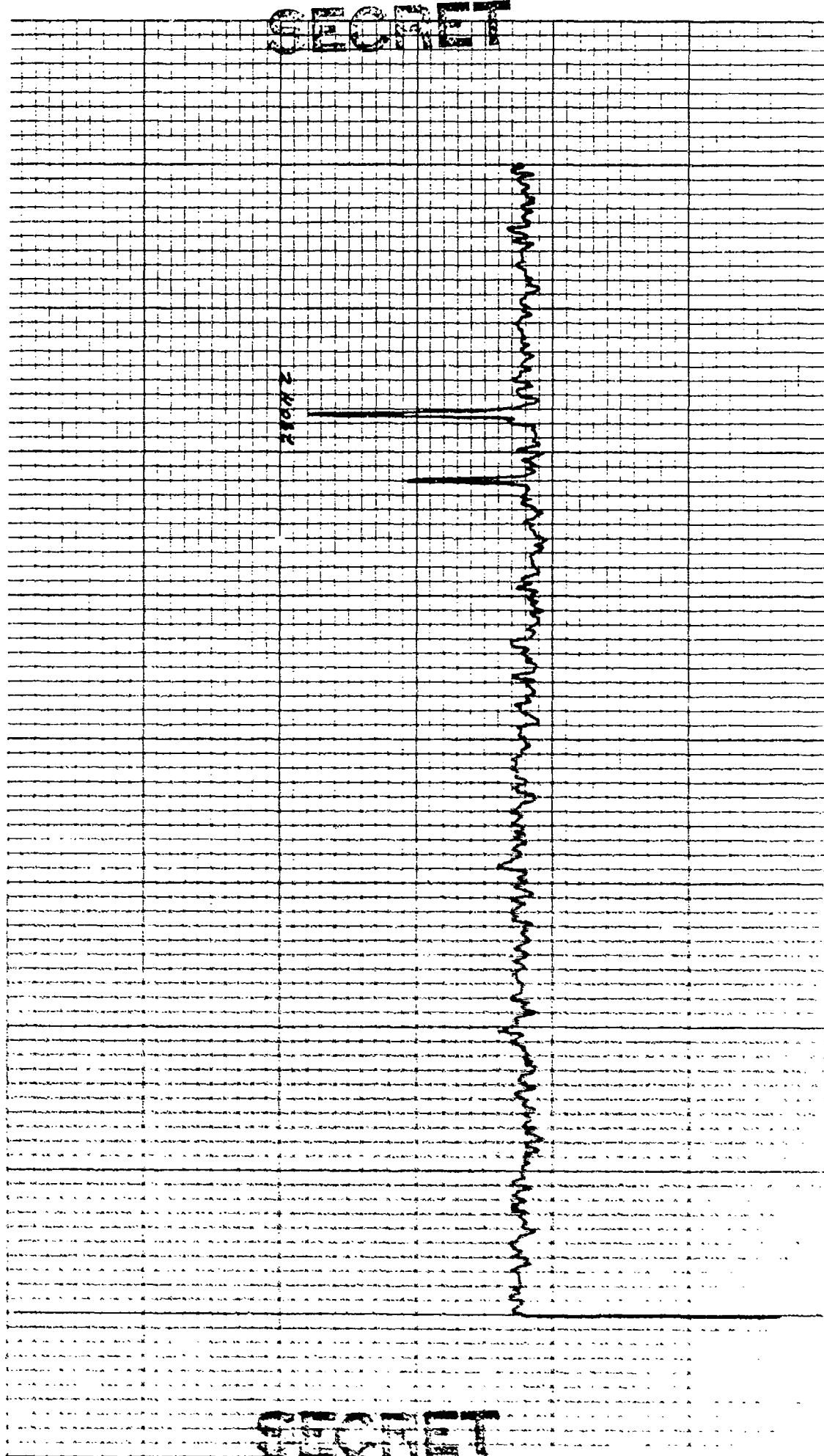
46 0703

CONTROL: 0935 - 16 (0011)
BEAMFORMED SPECTRUM(ELEMENTS)
EXERCISE: BEARING STAKE
CENTER FREQ: 270 HZ
16 ELEMENTS

DATE OF ANALYSIS: 1-16
DATE/TIME: 3-16-77 - 0935 Z
ANALYSIS BANDWIDTH: 1/10 HZ
+ 70 DEC. AZ STEERING

REEL: 412
INDE X 566

INTEGRATION TIME 320 SECS
ATTN: -10 DB
FILTER
WTG: HANNING



10 X 10 TO THE INCHES
RECAPIT A SEACH (S) MADE IN 1974

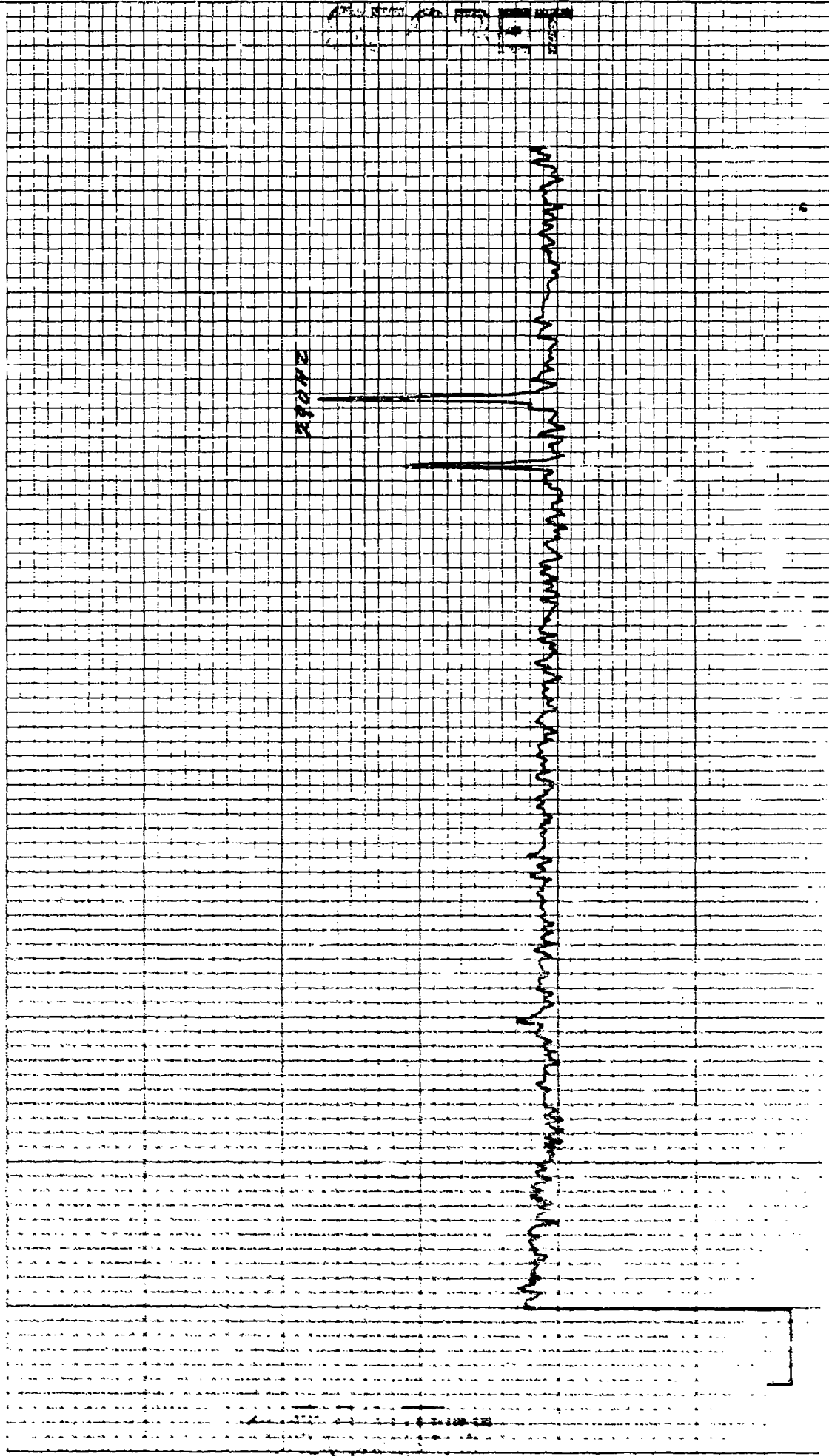
46 0703

CONTROL: 0935 - 16 (D911)
BEAMFORMED SPECTRUM(ELEMENTS
EXERCISE: BEARING STAKE
CENTER FREQ: 270 HZ
16 ELEMENTS

DATE OF ANALYSIS: 1-16
DATE/TIME: 3-16-77 - 0935 Z
ANALYSIS BANDWIDTH: 1/10HZ
+72 DEG. AZ STEERING

REEL: H22
INTEGRATION TIME 320 SECS
FILTER WTG: HANNING

INDE X 566



100E 10 X 10 TO THE INCHES 1 X 10 INCHES
RECEIVED A. E. S. CO. WASH. D. C.

46 0703

CONTROL: 0935 - 16 (2011)
BEAMFORMED SPECTRUM (ELEMENTS)
EXERCISE: BEARING STAKE
CENTER FREQ: 270 HZ
16 ELEMENTS

DATE OF ANALYSIS: 1-16
DATE/TIME: 3-16-77 - 0935Z
ANALYSIS BANDWIDTH: 1/10HZ
474 DEG. AZ STEERING

REEL: 1122
INTEGRATION TIME 320 SECS
FILTER
ATTEN: -18 DB
WTG: HANNING

INDE X 566

SECRET

SECRET

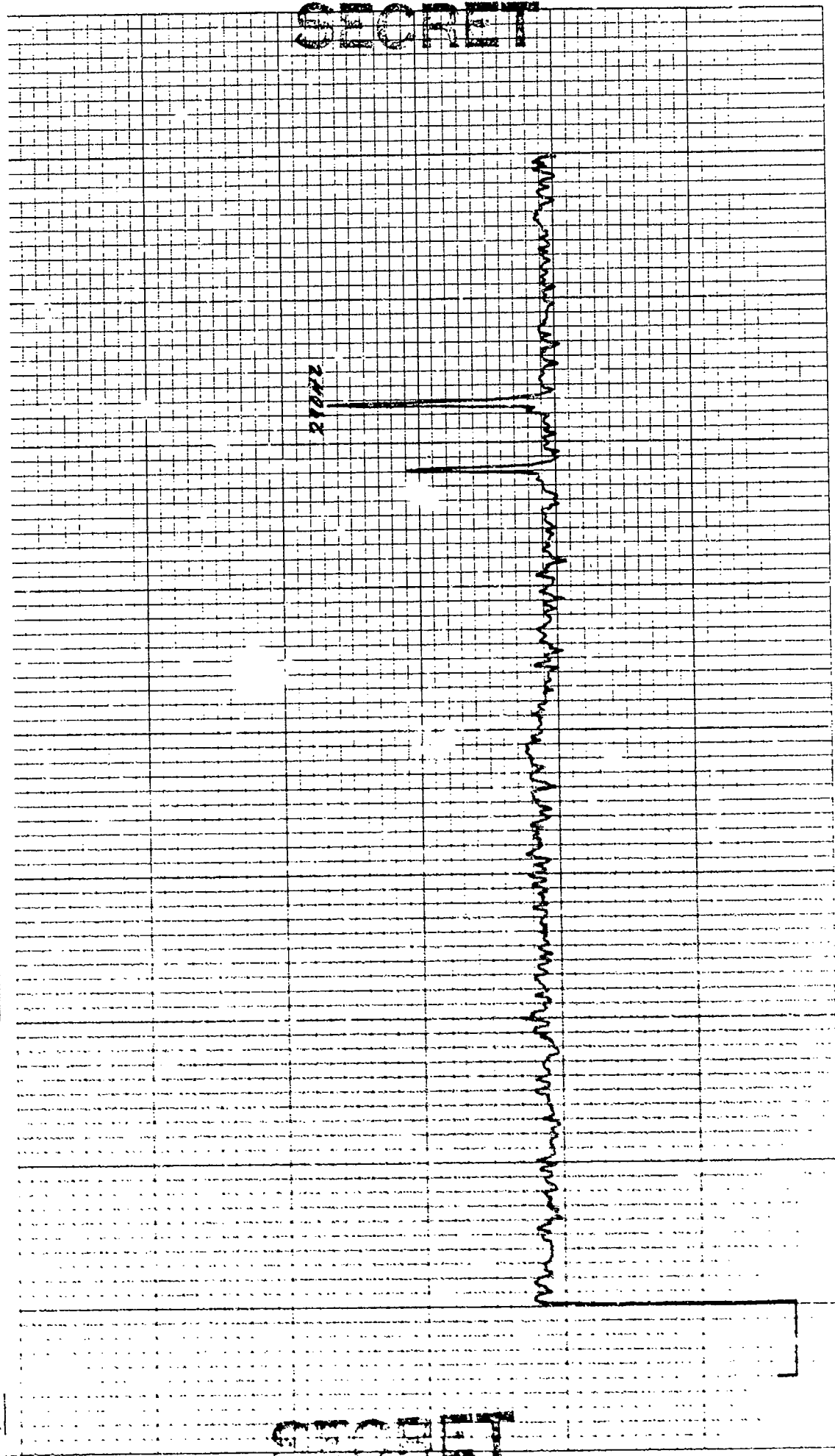
SECRET

SECRET

CONTROL: 0935-16 (DP11)
 BEAMFORMED SPECTRUM(ELEMENTS
 EXERCISE: BEARING STAKE
 CENTER FREQ: 270 HZ
16 ELEMENTS

DATE OF ANALYSIS: 1-16
 DATE/TIME: 3-16-77 - 0935 Z
 ANALYSIS BANDWIDTH: 1/10 HZ
775 DEG. AZ STEERING

REEL: 1122 INDE X 566
 INTEGRATION TIME 320 SECS
 FILTER
 ATTN: -16 DB
 WTG: HANNING



SECRET

SECRET

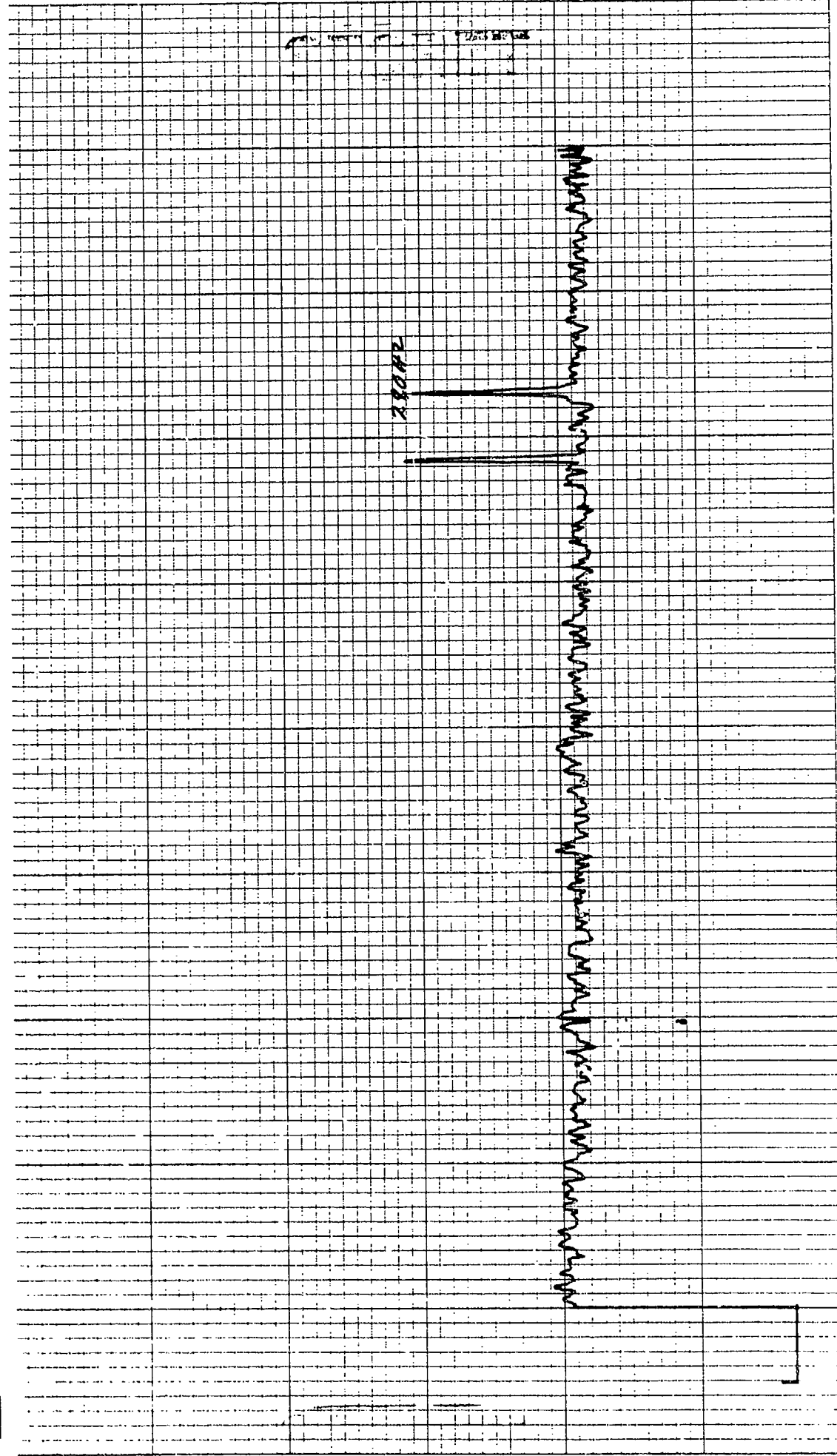
4E 0703

REEL: 422
INDEX 566

DATE OF ANALYSIS: 1-16)
DATE/TIME: 3-16-77 - 0835 Z
ANALYSIS BANDWIDTH: 1/10HZ
+ 78 DEG. AZ STEERING

REEL: 1122
INTEGRATION TIME 320 SECS
FILTER

ATTN: -18 DB
WTG: HANNING



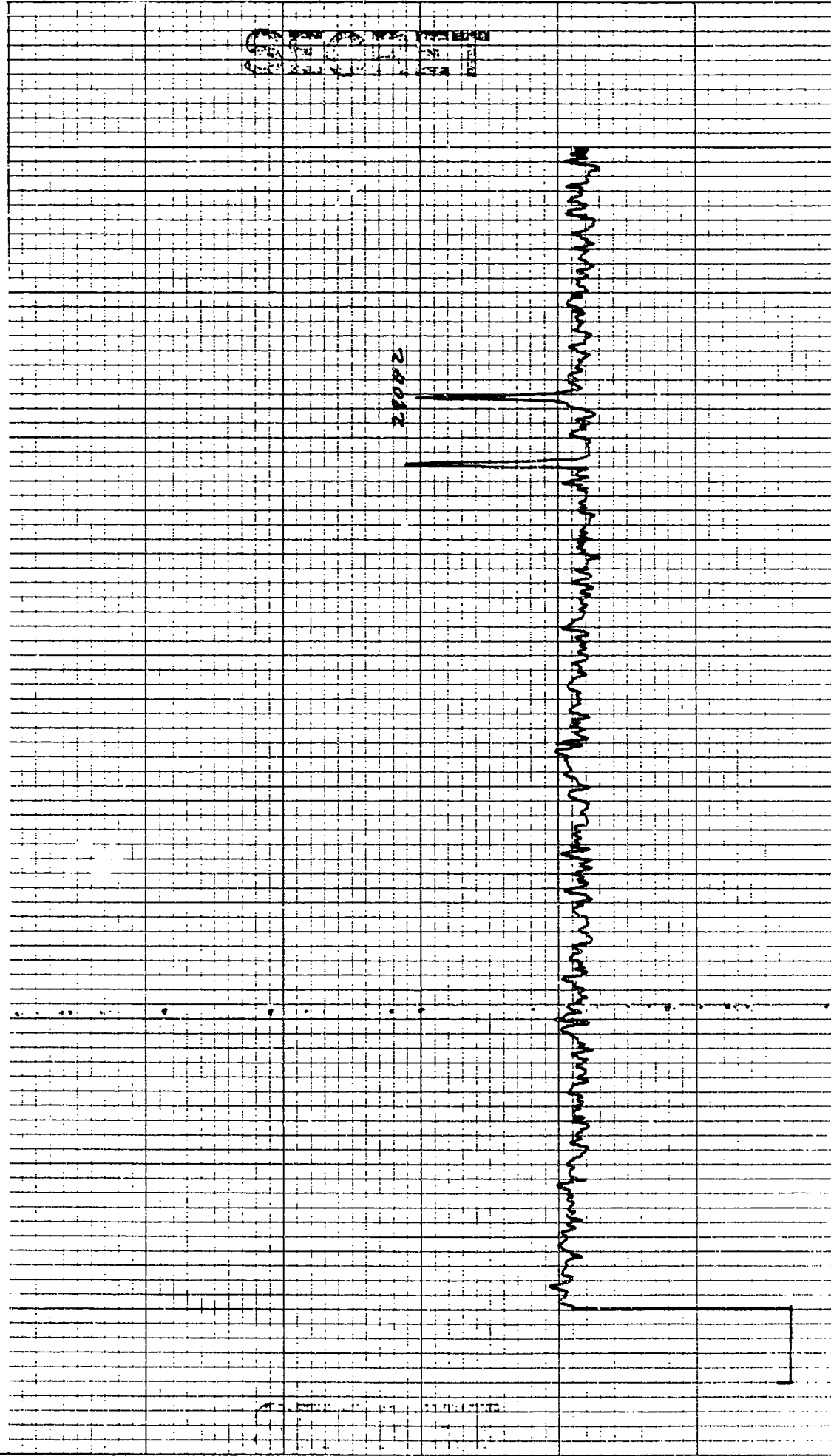
10 X 10
KEUFFEL & ESSER CO. MADE IN U.S.A.

46 0703

CONTROL: 0935 - 16 (DP11)
BEAMFORMED SPECTRUM (ELEMENTS)
EXERCISE: BEARING STAKE
CENTER FREQ: 270 HZ
16 ELEMENTS

DATE OF ANALYSIS: - - -
1-76
DATE/TIME: 3-16-77 - 0935Z
ANALYSIS BANDWIDTH: 1/10HZ
+ 90 DEG. AZ STEERING

REEL: M2P
INDE X566
INTEGRATION TIME 320 SECS
ATTEN: -18 DB
FILTER
WTG: HANNING



CONFIDENTIAL

SIGNAL LEVEL AND SNR

CALCULATIONS

DATA POINT 11

FREQUENCY 140 HZ

NUMBER OF ELEMENTS 32

SIGNAL LEVEL

MCPS-32 SIGNAL LEVEL INDICATED	<u>-30.6</u>	
MCPS-32 CAL. CORRECTION	<u>+10</u>	-20.6
BEAMFORMER GAIN	<u>+24</u>	+3.4 SIG. LEVEL FOR SNR CALCULATION
MRA CORRECTION	<u>+ .2</u>	+3.6 SIG. LEVEL FOR SIGNAL GAIN

NOISE LEVEL

MCPS-32 SIGNAL LEVEL INDICATED	<u>-59.4</u>	
MCPS-32 CAL. CORRECTION	<u>+10</u>	-49.4
BEAMFORMER GAIN	<u>+24</u>	-25.0 NOISE LEVEL FOR SNR CALCULATION

SIGNAL-NOISE-RATIO

SIGNAL LEVEL FOR SNR	<u>+3.4</u>	
SIGNAL LEVEL FOR SNR	<u>-25.0</u>	28.4
PROCESSOR CORRECTION	<u>-4.0</u>	24.4
MRA CORRECTION	<u>+ .2</u>	24.6 SNR 1/10 HZ BAND
BANDWIDTH CONVERSION	<u>-8.2</u>	16.4 SNR 1 HZ BAND

SIGNAL LEVEL AND SNR

CALCULATIONS

DATA POINT 11

FREQUENCY 290 HZ

NUMBER OF ELEMENTS 32

SIGNAL LEVEL

MCPS-32 SIGNAL LEVEL INDICATED		<u>-45.6</u>	
MCPS-32 CAL. CORRECTION	<u>+10</u>	-35.6	
BEAMFORMER GAIN	<u>+24</u>	-11.6	SIG. LEVEL FOR SNR CALCULATION
MRA CORRECTION	<u>+ .8</u>	-12.4	SIG. LEVEL FOR SIGNAL GAIN

NOISE LEVEL

MCPS-32 SIGNAL LEVEL INDICATED		<u>-68.9</u>	
MCPS-32 CAL. CORRECTION	<u>+10</u>	-58.9	
BEAMFORMER GAIN	<u>+24</u>	-34.9	NOISE LEVEL FOR SNR CALCULATION

SIGNAL-NOISE-RATIO

SIGNAL LEVEL FOR SNR		<u>-11.6</u>	
SIGNAL LEVEL FOR SNR	<u>-34.9</u>	23.3	
PROCESSOR CORRECTION	<u>-4.0</u>	19.3	
MRA CORRECTION	<u>+ .8</u>	20.1	SNR 1/10 HZ BAND
BANDWIDTH CONVERSION	<u>-8.2</u>	11.9	SNR 1 HZ BAND

CONFIDENTIAL

DATA POINT 11SIGNAL GAIN

	<u>140 HZ</u>	<u>290HZ</u>	<u>295HZ</u>
MEAN OMNI SIGNAL LEVEL	<u>-29.8</u>	<u>-41.4</u>	<u> </u>
MRA SIGNAL LEVEL	<u>+ 3.6</u>	<u>-12.4</u>	<u> </u>
ARRAY SIGNAL GAIN	<u>33.4</u>	<u>29.0</u>	<u> </u>
20 LOG <u>32</u>	<u>34.1</u>	<u>34.1</u>	<u> </u>
# of elements			
	<u>- .7</u>	<u>- 5.1</u>	<u> </u>
DIFFERENCE	<u> </u>	<u> </u>	<u> </u>

ARRAY GAIN

MRA SNR	<u>24.6</u>	<u>20.1</u>	<u> </u>
MEAN OMNI SNR	<u>16.2</u>	<u>8.4</u>	<u> </u>
ARRAY GAIN	<u>8.4</u>	<u>11.7</u>	<u> </u>
THEORETICAL AZMUTH GAIN	<u>10.9</u>	<u>13.0</u>	<u> </u>
(at MRA)			
	<u>-2.5</u>	<u>-1.3</u>	<u> </u>
DIFFERENCE	<u> </u>	<u> </u>	<u> </u>

K02 10 X 10 TO THE INCH • 7 X 10 INCHES
KEUFFEL & ESSER CO. MADE IN U.S.A.

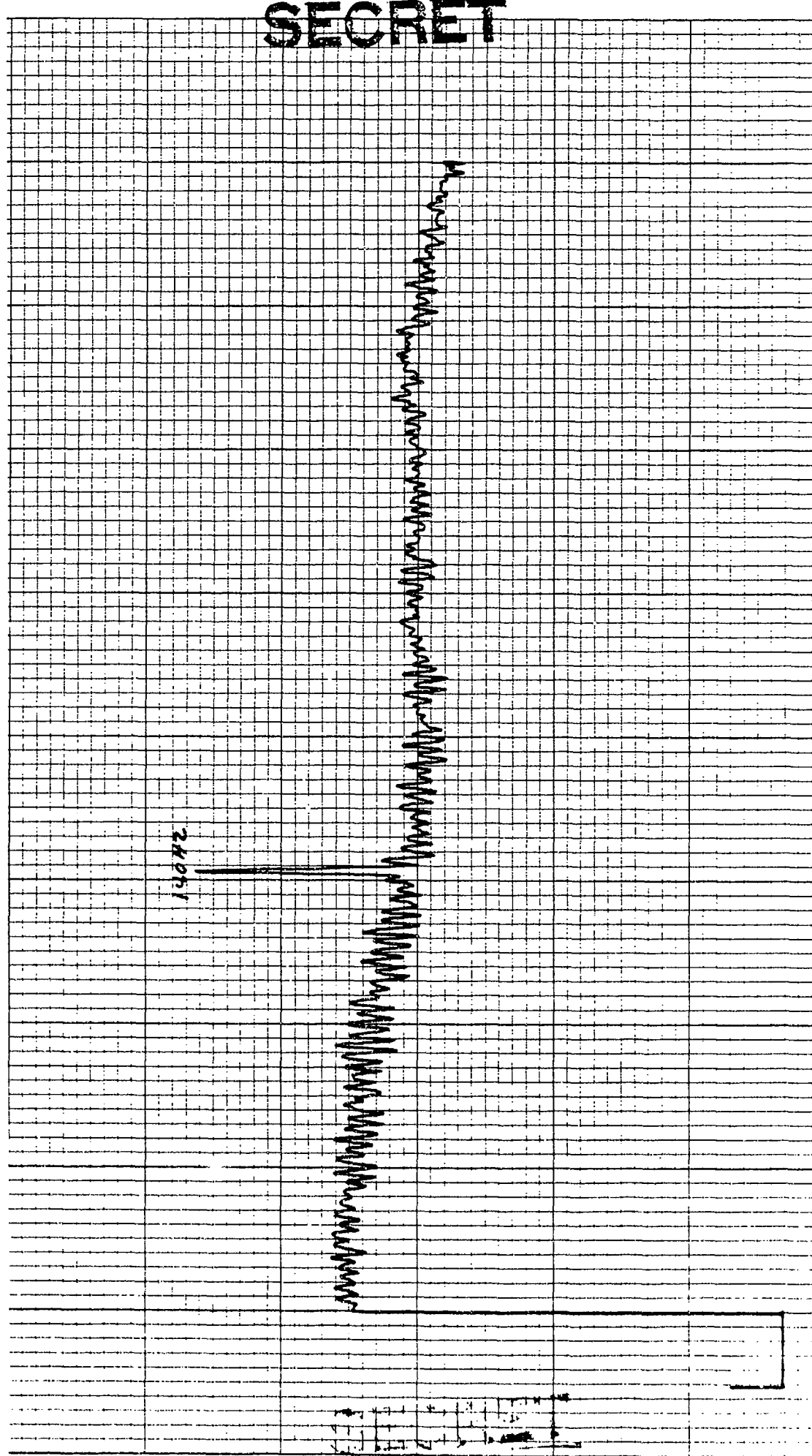
46 0703

CONTROL: 0936 - 32 (2011)
BEAMFORMED SPECTRUM (ELEMENTS)
EXERCISE: BEARING STAKE
CENTER FREQ: 150 HZ
32 ELEMENTS

DATE OF ANALYSIS: 1-26-77
DATE/TIME: 3-26-77 - 0935Z
ANALYSIS BANDWIDTH: 1/10 HZ
+50 DEG. AZ STEERING

REEL: 122
INDE X 566

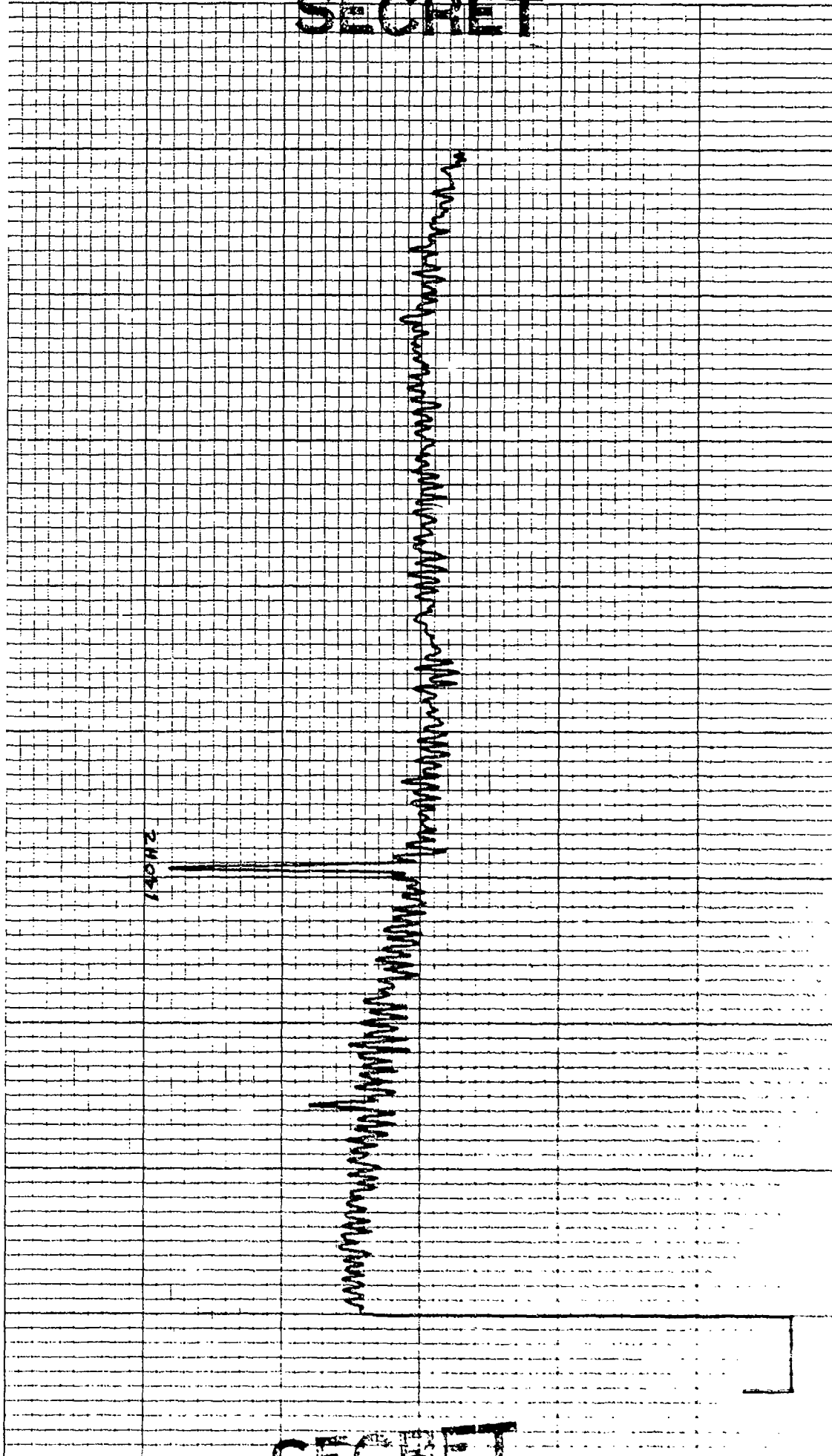
INTEGRATION TIME 320 SECS
ATTEN: -24 DB
FILTER
WTG: HANNING



K-Σ 10 X 10 TO THE INCH • 7 X 10 INCHES
KEUFFEL & ESSER CO. MADE IN U.S.A.

46 0703

CONTROL: 0035-32 (DPH) DATE OF ANALYSIS: 1-26-34 REEL: 422 INDEX: 566
BEAMFORMED SPECTRUM (ELEMENTS) 1-26-34
EXERCISE: BEARING STAKE DATE/TIME: 3-16-77 - 0035 Z INTEGRATION TIME 320 SECS ATTN: -84 DB
CENTER FREQ: 150 HZ ANALYSIS BANDWIDTH: 1/10 HZ FILTER WTG: HANNING
32 ELEMENTS +52 DEG. AZ STEERING



10 X 10 TO THE INCHES - 5 TO THE INCHES
RECEIVED 6 OCT 77 10 00 AM

46 0703

CONTROL: 0935 - 32 (DP4)
BEAMFORMED SPECTRUM (ELEMENTS)
EXERCISE: BEARING STAKE
CENTER FREQ: 150 HZ
32 ELEMENTS
DATE OF ANALYSIS: 1-26-77
DATE/TIME: 3-26-77-0935 Z
ANALYSIS BANDWIDTH: 1/10 HZ
+54 DEG. AZ STEERING
INTEGRATION TIME 320 SECS
FILTER WTG: HANNING
REEL: 122
INDE X526
ATTN: 24 DB

140 HZ

SECRET

SECRET

KOE 10 X 10 TO THE INCH • 7 X 10 INCHES
KEUFFEL & ESSER CO. MADE IN U.S.A.

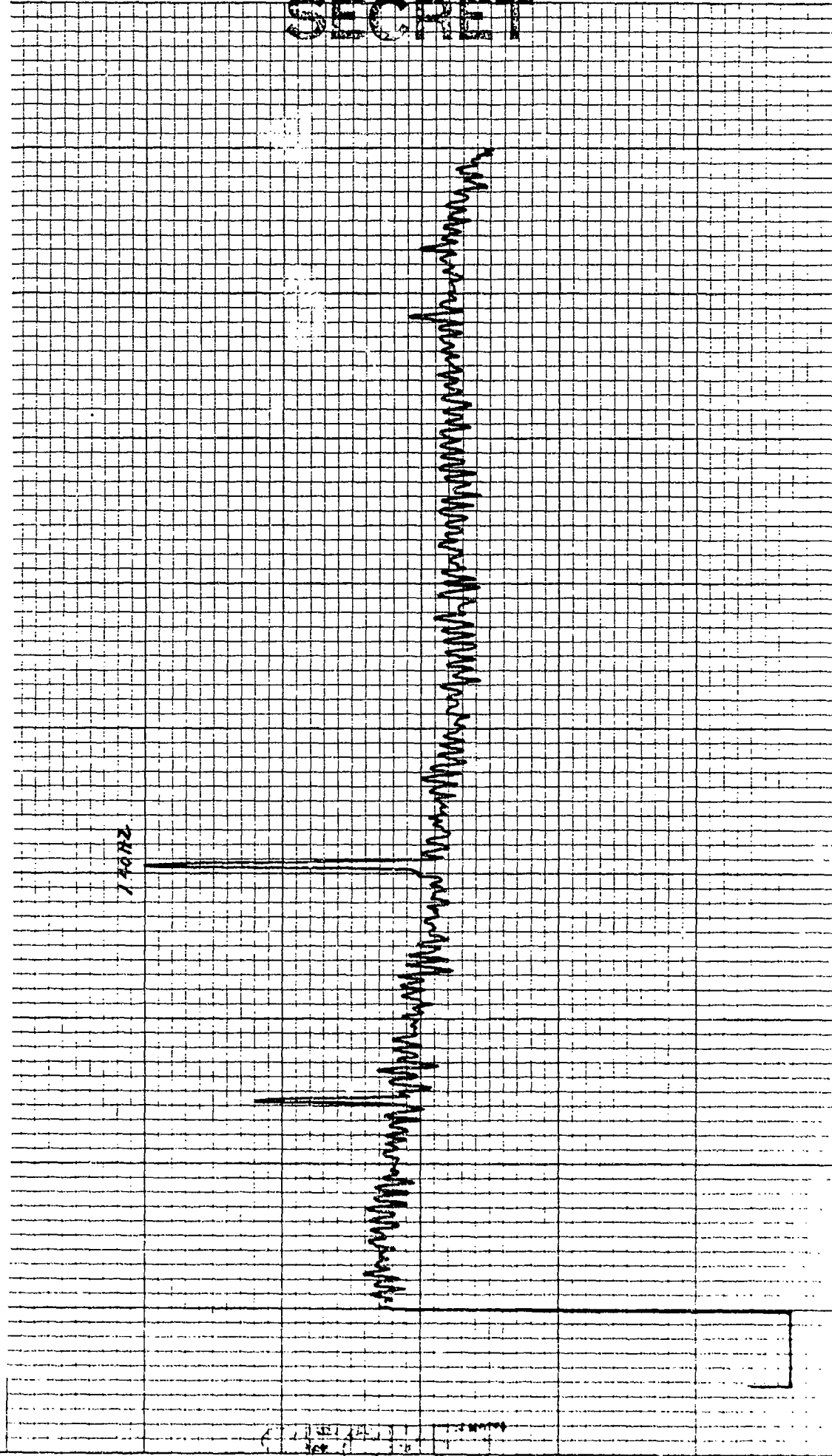
46 0703

CONTROL: 0935 - 32 (DP11)
BEAMFORMED SPECTRUM (ELEMENTS)
EXERCISE: BEARING STAKE
CENTER FREQ: 150 HZ
32 ELEMENTS

DATE OF ANALYSIS: 1-26-77 08-34)
DATE/TIME: 3-16-77-0835Z
ANALYSIS BANDWIDTH: 1/10HZ
4-56 DEG. AZ STEERING

REEL: 122-
INTEGRATION TIME 320 SECS
FILTER WTG: HANNING

INDE X 526



SECRET

140E 10 X 10 TO THE INCH = 2 X 10 INCHES
KEUFFEL & ESSER CO. MADE IN U.S.A.

46 0703

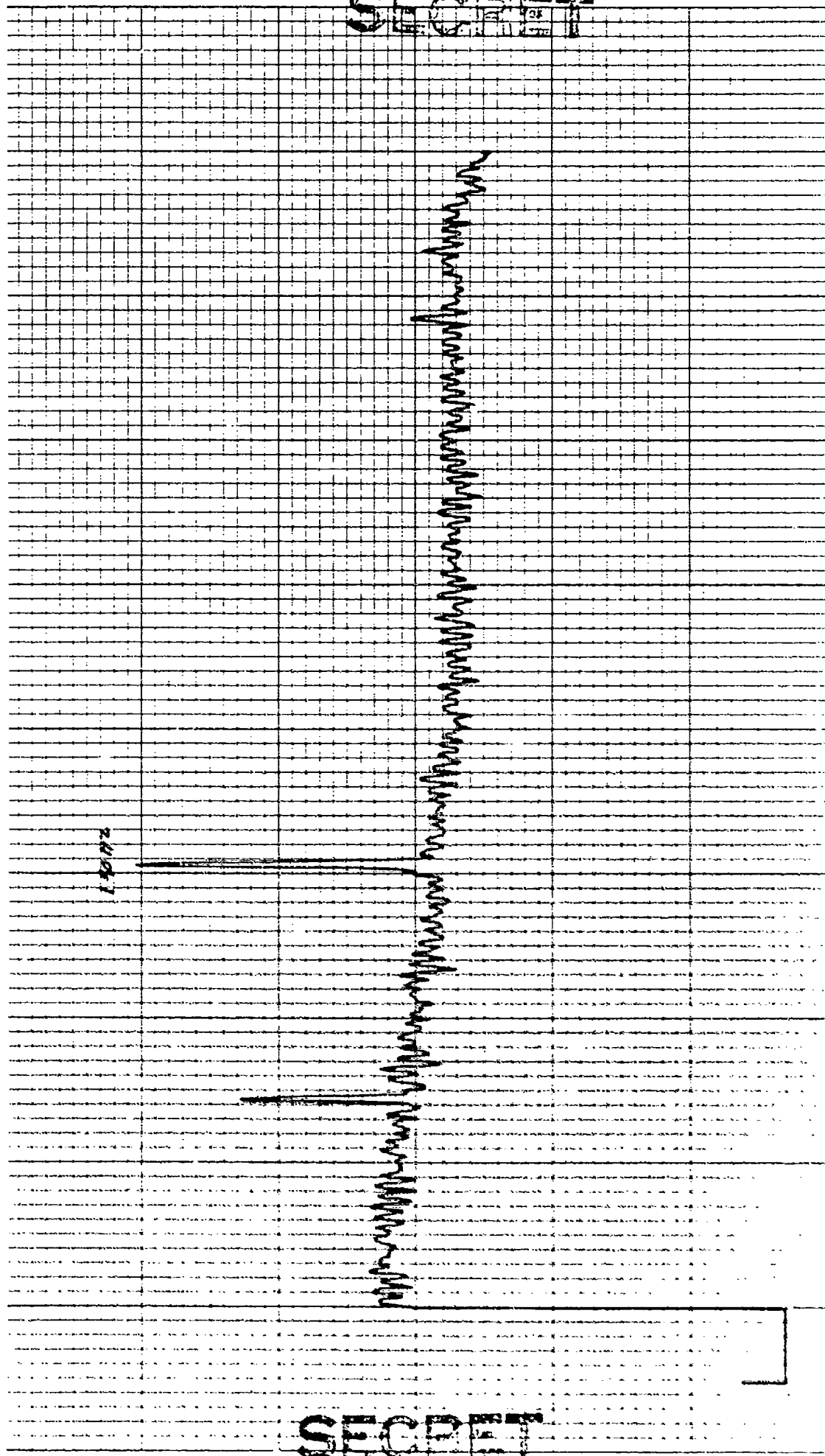
CONTROL: 0935 - 32 (2P11)
BEAMFORMED SPECTRUM (ELEMENTS)
EXERCISE: BEARING STAKE
CENTER FREQ: 250 HZ
32 ELEMENTS

DATE OF ANALYSIS: - - -
1-26-77 20-34

DATE/TIME: 3-6-77 - 0935 Z
ANALYSIS BANDWIDTH: 1/10 HZ
+50 DEG. AZ STEERING

REEL: H22
INTEGRATION TIME 320 SECS
FILTER
WTG: HANNING

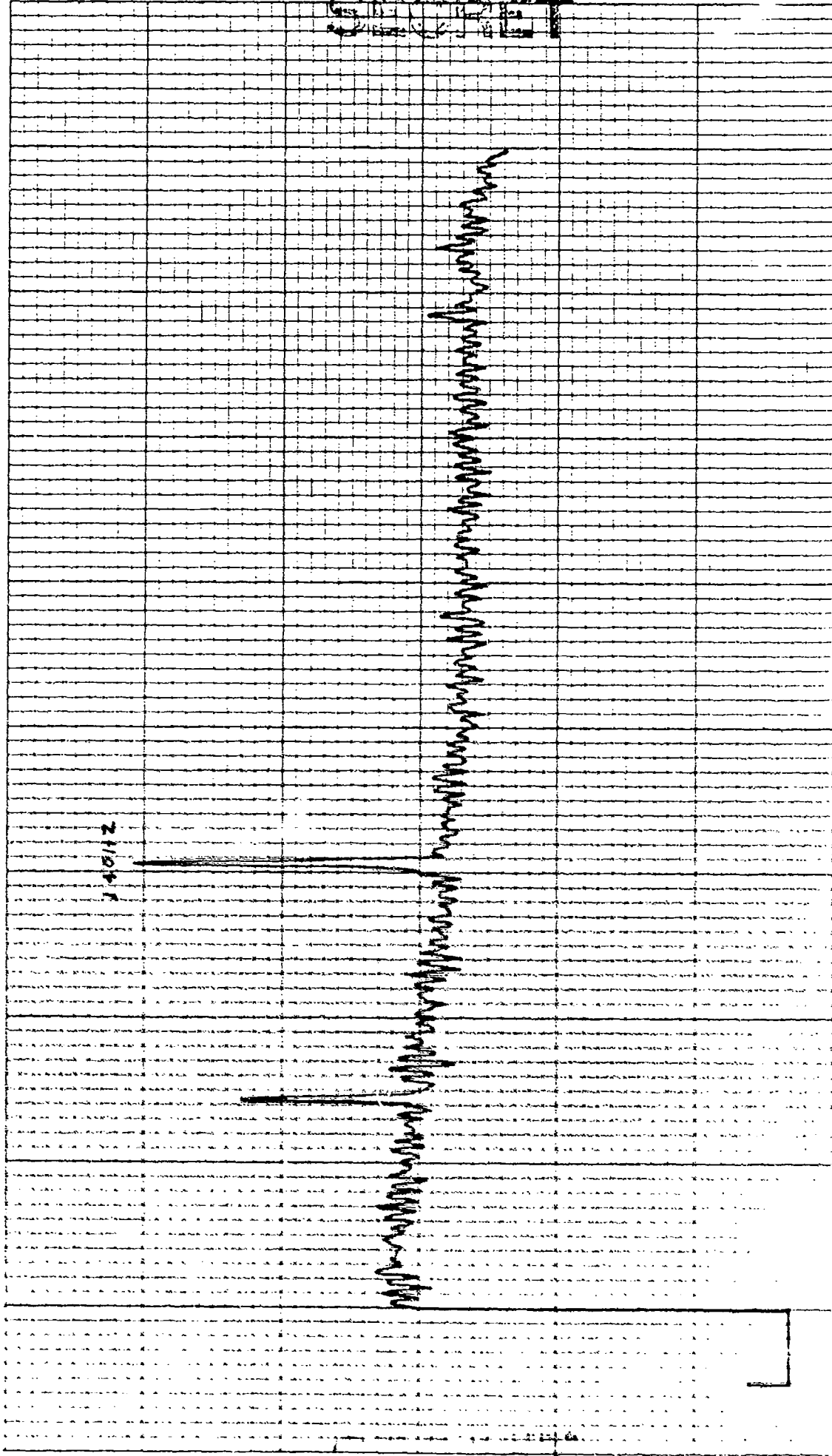
INDEX 566



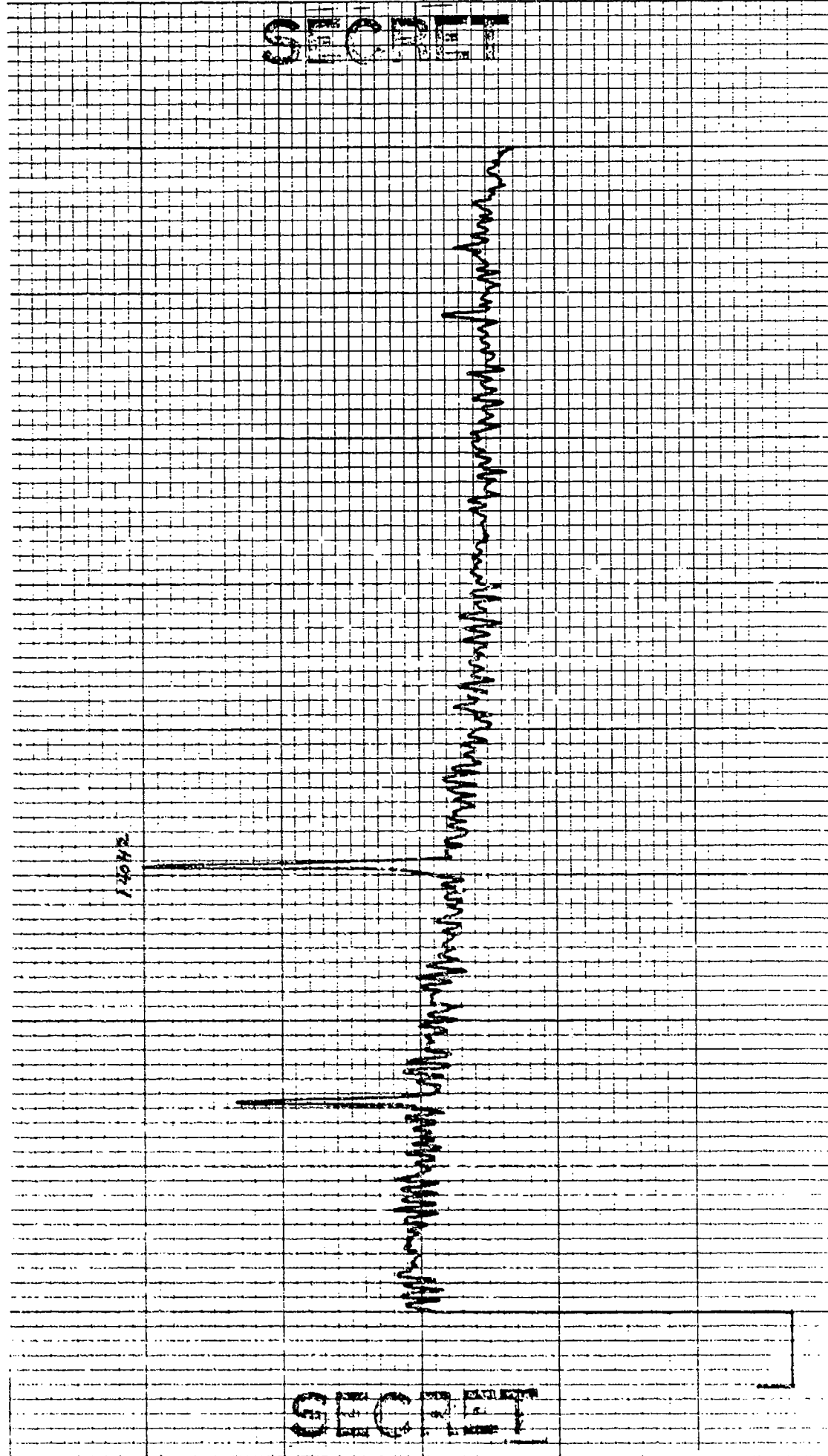
10 X 10 TO FIVE (INCHES) + 10 HAP HES
NEUTRAL 0.000000 0.000000 0.000000

46 0703

CONTROL: 0925 - 51 (DPH) REEL: M22 INDEX X 522
BEAMFORMED SPECTRUM(ELEMENTS) DATE OF ANALYSIS: 1-26-77 29-34
EXERCISE: BEARING STAKE DATE/TIME: 3-16-77 - 0925 Z INTEGRATION TIME 320 SECS ATTN: 24 DB
CENTER FREQ: 160 HZ ANALYSIS BANDWIDTH: 1/10 HZ FILTER WTC: HANNING
72 ELEMENTS +59 DEG. AZ STEERING



CONTROL: 0935 - 32 (DPH) DATE OF ANALYSIS: 1-26-77 REEL: 1122 INDE X 566
 BEAMFORMED SPECTRUM(ELEMENTS))
 EXERCISE: BEARING STAKE DATE/TIME: 3-26-77 - 0935 Z INTEGRATION TIME 320 SECS ATTN: 24 DB
 CENTER FREQ: 150 HZ ANALYSIS BANDWIDTH: 1/10 HZ FILTER WTG: HANNING
 32 ELEMENTS + 62 DEG. AZ STEERING



0935

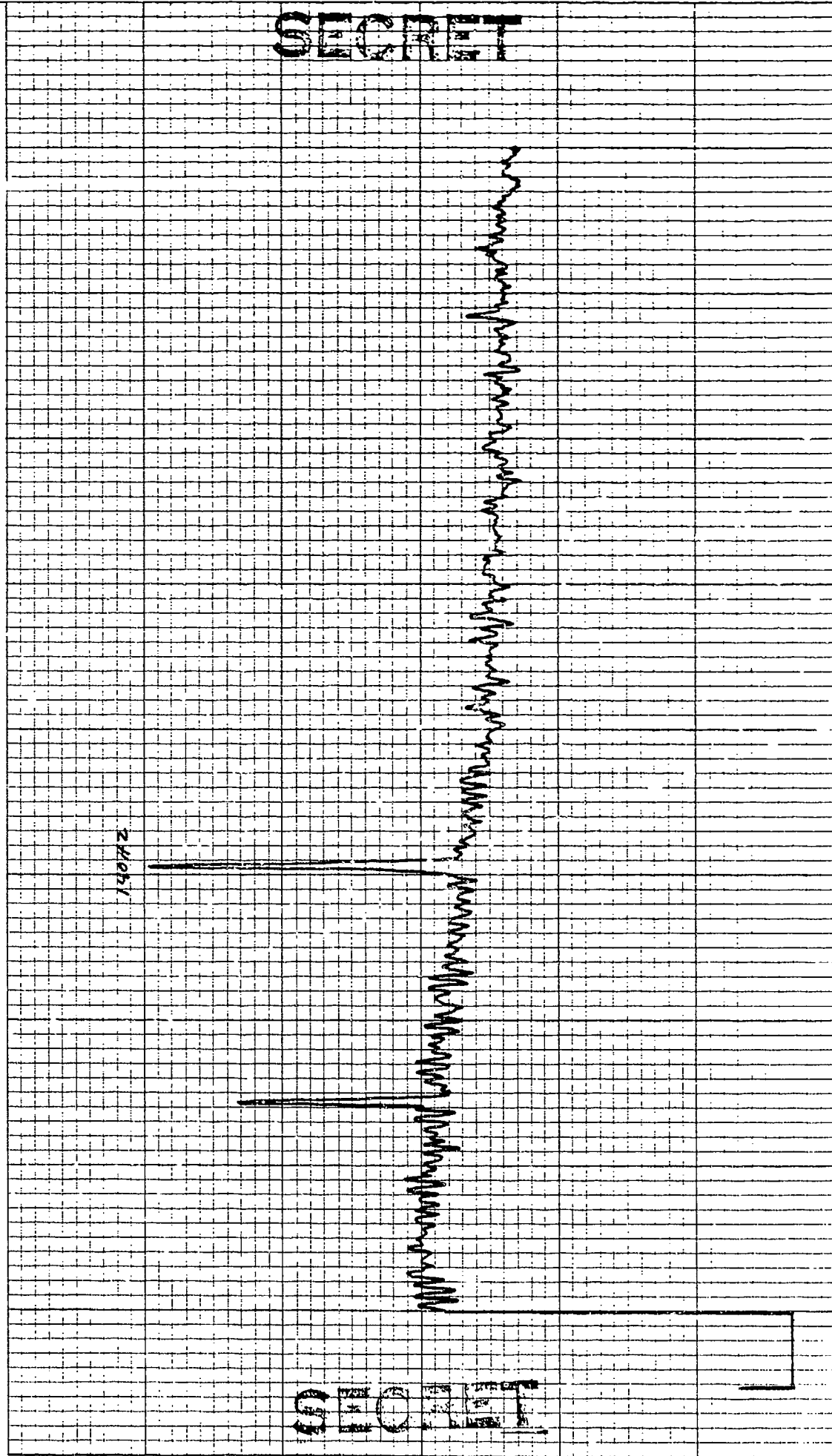
0935

10 X 10 TO THE INCH • 7 X 10 INCHES
KEUFFEL & ESSER CO. MADE IN U.S.A.

K.E.

46 0703

CONTROL: 0035 - 32 (SP11) DATE OF ANALYSIS: 1-26-77 REEL: M22 INDE X 566
BEAMFORMED SPECTRUM (ELEMENTS))
EXERCISE: BEARING STAKE DATE/TIME: 3-16-77-0835 Z INTEGRATION TIME 320 SECS ATTEN: -24 DB
CENTER FREQ: 150 HZ ANALYSIS BANDWIDTH: 1/10 HZ FILTER WTG: HANNING
32 ELEMENTS +63 DEG. AZ STEERING



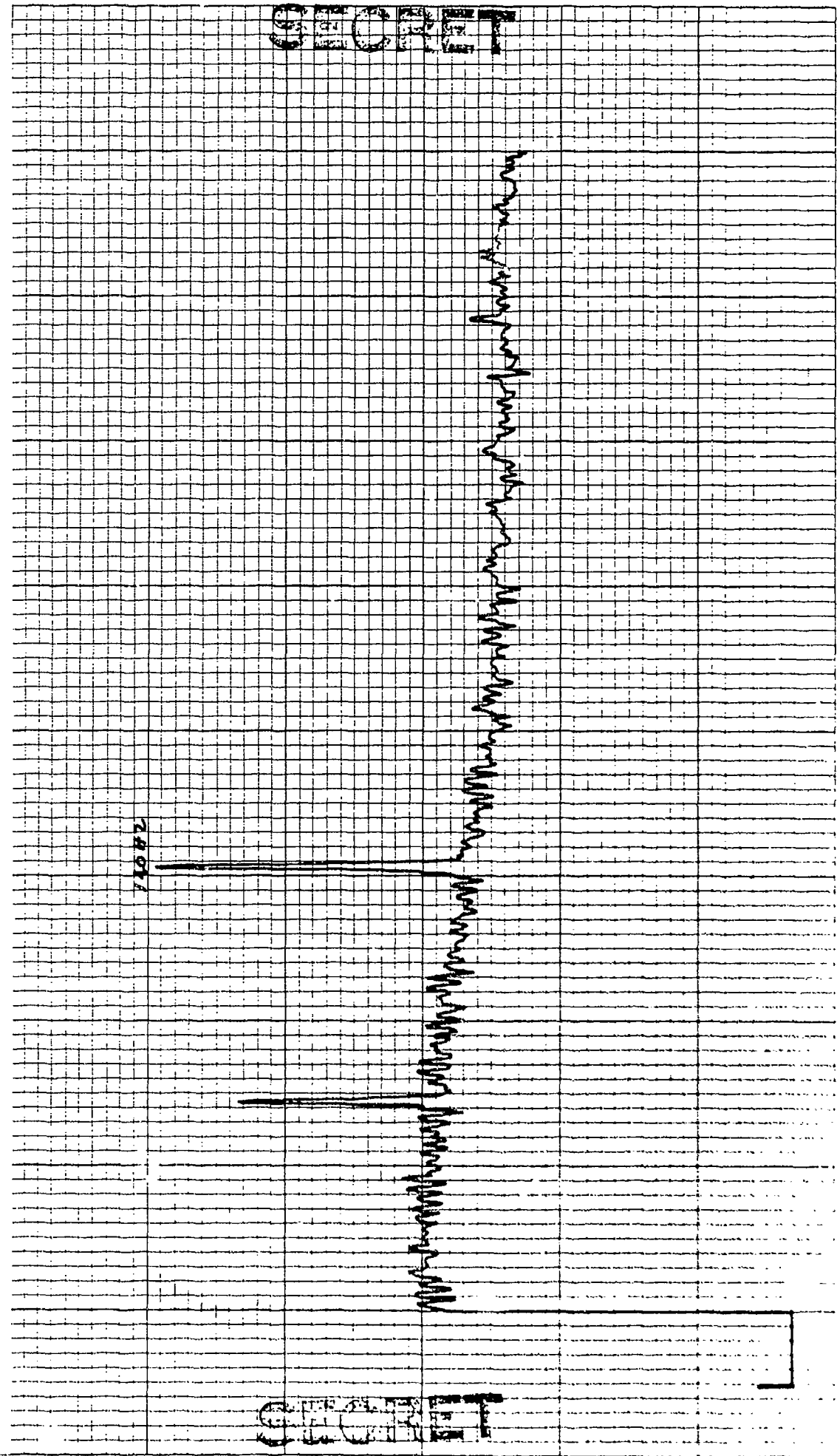
K&E 10 X 10 TO THE INCH • 7 X 10 INCHES
KEUFFEL & ESSER CO. MADE IN U.S.A.

46 0703

CONTROL: 0935 - 32 (0911)
BEAMFORMED SPECTRUM (ELEMENTS)
EXERCISE: BEARING STAKE
CENTER FREQ: 250 HZ
32 ELEMENTS

DATE OF ANALYSIS: 1-26-77
DATE/TIME: 3-16-77 - 0935 Z
ANALYSIS BANDWIDTH: 1/10 HZ
+64 DEG. AZ STEERING

REEL: H&2
INTEGRATION TIME 320 SECS
FILTER
ATTEN: -34 DB
WTG: HANNING
INDE X 526



46 0703

DATE OF ANALYSIS: - - -
1-26 422-34)
DATE/TIME: 3-6-77 - 0835 Z
ANALYSIS BANDWIDTH: 1/10HZ
+66 DEC. AZ STEERING

REEL: M92
INDEX 526

INTEGRATION TIME 320 SECS ATTEN:-34 DB
FILTER WTC: HANNING

DATE/TIME: 3-6-77 - 0935 Z
ANALYSIS BANDWIDTH: 1/10HZ
+66 DEG. AZ STEERING

SECRET

10 X 10 TO THE INCH • 7 X 10 INCHES
KEUFFEL & ESSER CO. MADE IN U.S.A.

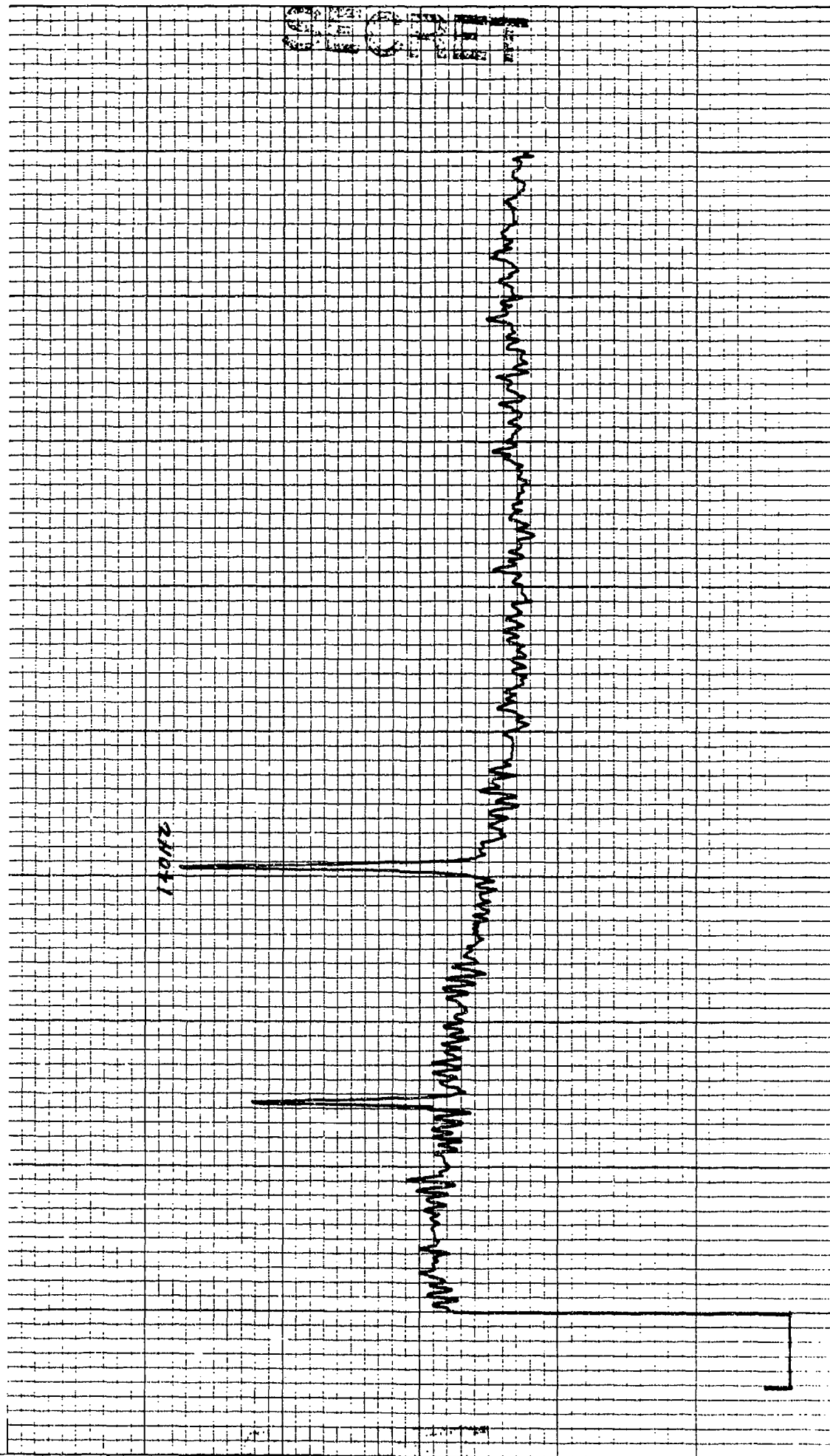
46 0703

CONTROL: 0935 - 32 (DRI)
BEAMFORMED SPECTRUM (ELEMENTS)
EXERCISE: BEARING STAKE
CENTER FREQ: 150 HZ
32 ELEMENTS

DATE OF ANALYSIS: 1-26-77
DATE/TIME: 3-16-77 - 0835 Z
ANALYSIS BANDWIDTH: 1/10 HZ
+68 DEG. AZ STEERING

REEL: H22
INTEGRATION TIME 320 SECS
FILTER WTG: HANNING

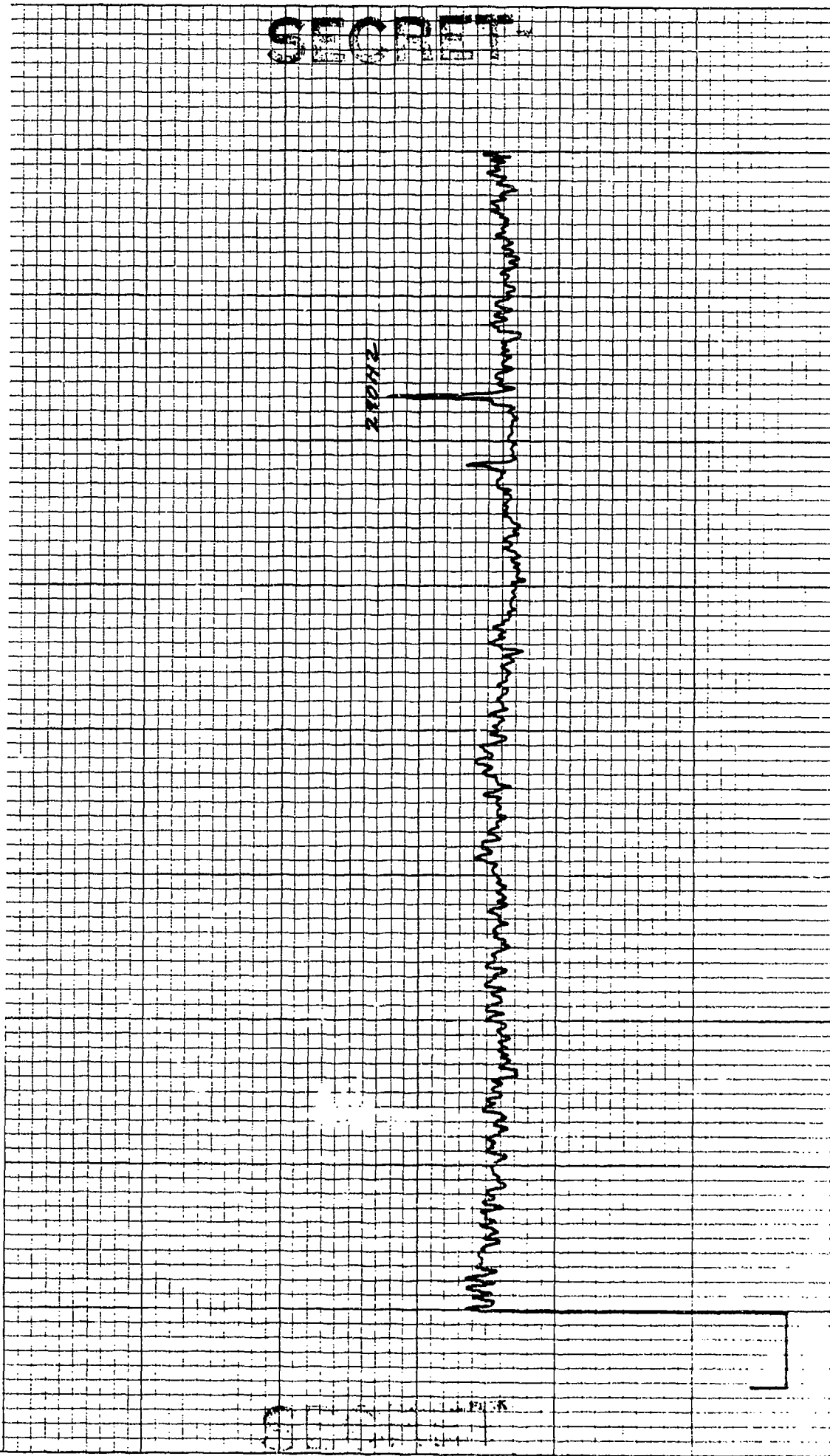
INDEX 566
ATTEN: -24 DB



K-2 10 X 10 TO THE INCH • 7 X 10 INCHES
KEUFFEL & ESSER CO. MADE IN U.S.A.

46 0703

CONTROL: 0935-32 (DP11) DATE OF ANALYSIS: 1-26-77 REEL: 722 INDEX: X 566
BEAMFORMED SPECTRUM(ELEMENTS) 28-34)
EXERCISE: BEARING STAKE DATE/TIME: 3-16-77-0935Z
CENTER FREQ: 270 HZ ANALYSIS BANDWIDTH: 1/10 HZ INTEGRATION TIME 320 SECS ATTEN: -24 DB
32 ELEMENTS +50 DEG. AZ STEERING FILTER WTG: HANNING



KOE 10 X 10 TO THE INCH • 7 X 10 INCHES
KEUFFEL & ESSER CO. MADE IN U.S.A.

46 0703

CONTROL: 0935 - 32 (DPH) REEL: M22 INDE X 566
BEAMFORMED SPECTRUM (ELEMENTS)
EXERCISE: BEARING STAKE
CENTER FREQ: 270 HZ
32 ELEMENTS
DATE OF ANALYSIS: 1-26-77)
DATE/TIME: 3-16-77 - 0935Z
ANALYSIS BANDWIDTH: 1/10 HZ
+ 52 DEG. AZ STEERING
INTEGRATION TIME 320 SECS ATTN: -24 DB
FILTER WTG: HANNING

SECRET

20042

[Handwritten squiggly line across the grid]

KOE 10 X 10 TO 10 X 10 INCHES
REMARKS

45 0703

CONTROL: 0035 - 72 (2011) DATE OF ANALYSIS: - - -
BEAMFORMED SPECTRUM (ELEMENTS) 1-26 29-34)
EXERCISE: BEARING STAKE
CENTER FREQ: 270 HZ
32 ELEMENTS
INTEGRATION TIME 320 SECS
FILTER WTC: HANNING
ATTEN: -24 DB
REEL: 102
INDE X 566

DATE/TIME: 3-16-77 - 0035 Z
ANALYSIS BANDWIDTH: 1/10 HZ
+ 54 DEG. AZ STEERING

270 HZ

SECRET

SECRET

K-2 10 X 10 TO THE INCH • 7 X 10 INCHES
KEUFFEL & ESSER CO. MADE IN U.S.A.

46 0703

CONTROL: 0935 - 32 (0911) DATE OF ANALYSIS: - - - - - REEL: M22 INDE X 566
BEAMFORMED SPECTRUM (ELEMENTS) 1-26 & 88-34)
EXERCISE: BEARING STAKE DATE/TIME: 3-16-77 - 0935 Z INTEGRATION TIME 320 SECS ATTEN: -24 DB
CENTER FREQ: 270 HZ ANALYSIS BANDWIDTH: 1/10 HZ FILTER WTG: HANNING
32 ELEMENTS +56 DEG. AZ STEERING

SECRET

REPORT

Handwritten notes and scribbles across the grid area.

10 X 10 TO THE INCH • 7 X 10 INCHES
KEUFEL & ESSER CO. MADE IN U.S.A.

46 0703

CONTROL: 0935 - 32 (0911)

BEAMFORMED SPECTRUM (ELEMENTS)

EXERCISE: BEARING STAKE

CENTER FREQ: 270 HZ

32 ELEMENTS

DATE OF ANALYSIS: - - -

1-26-77 28-34

DATE/TIME: 3-16-77-0935Z

ANALYSIS BANDWIDTH: 1/10 HZ

+ 50 DEG. AZ STEERING

REEL: 1121

INDE X566

INTEGRATION TIME 320 SECS

FILTER

ATTEN: -24 DB

WTG: HANNING

SECRET

21002

SECRET

46 0703

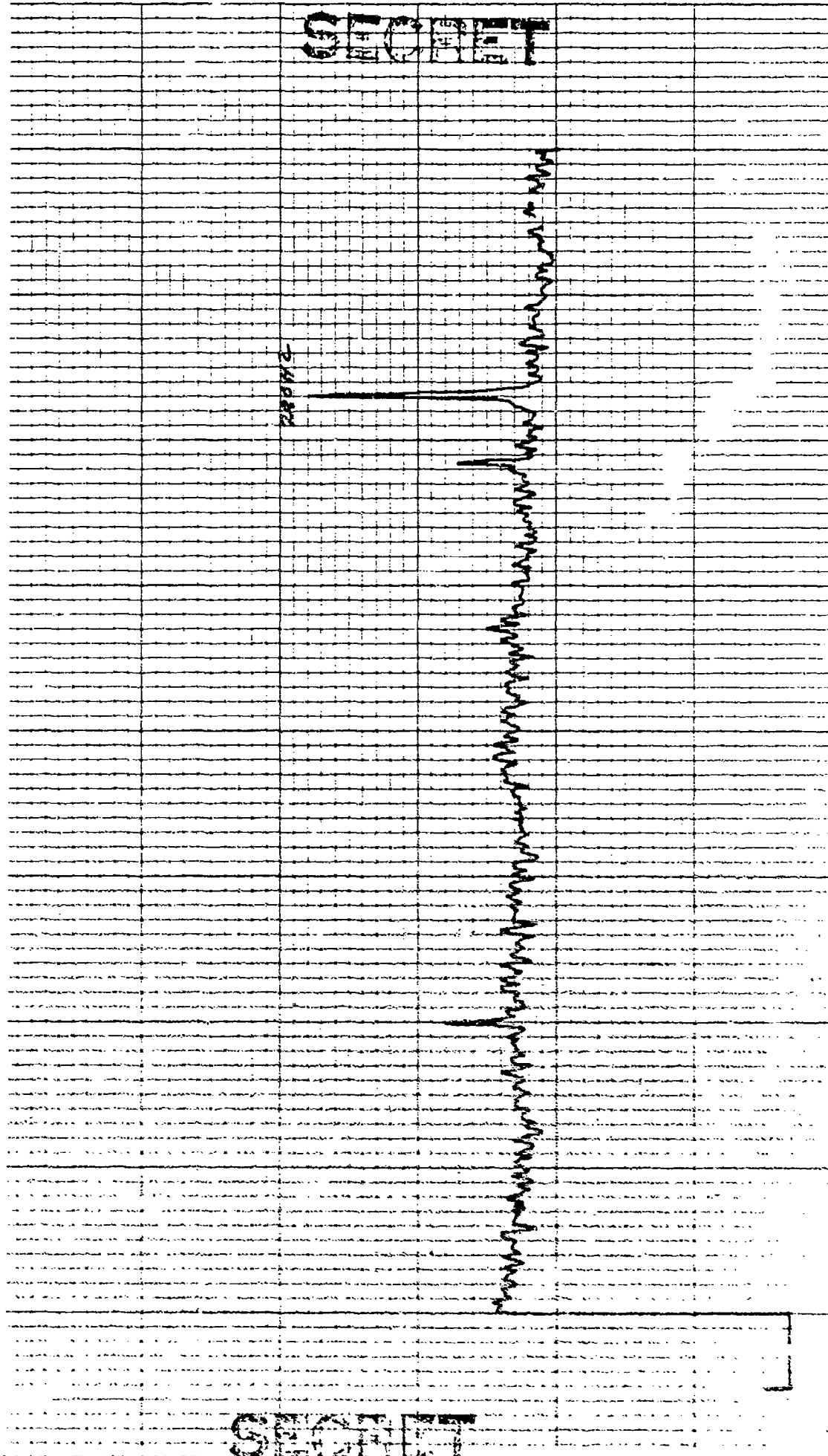
SECRET

2022

10 X 10 TO THE INCHES 10 X 10 INCHES
REUPPA & SONS CO. MADE IN U.S.A.

46 0703

CONTROL: 0935-32 (2011) DATE OF ANALYSIS: 1-26-77-0935Z REEL: 422 INDE X 566
BEAMFORMED SPECTRUM(ELEMENTS) INTEGRATION TIME 320 SECS ATTEN: -24 DB
EXERCISE: BEARING STAKE FILTER WTC: HANNING
CENTER FREQ: 270 HZ
52 ELEMENTS +60 DEG. AZ STEERING

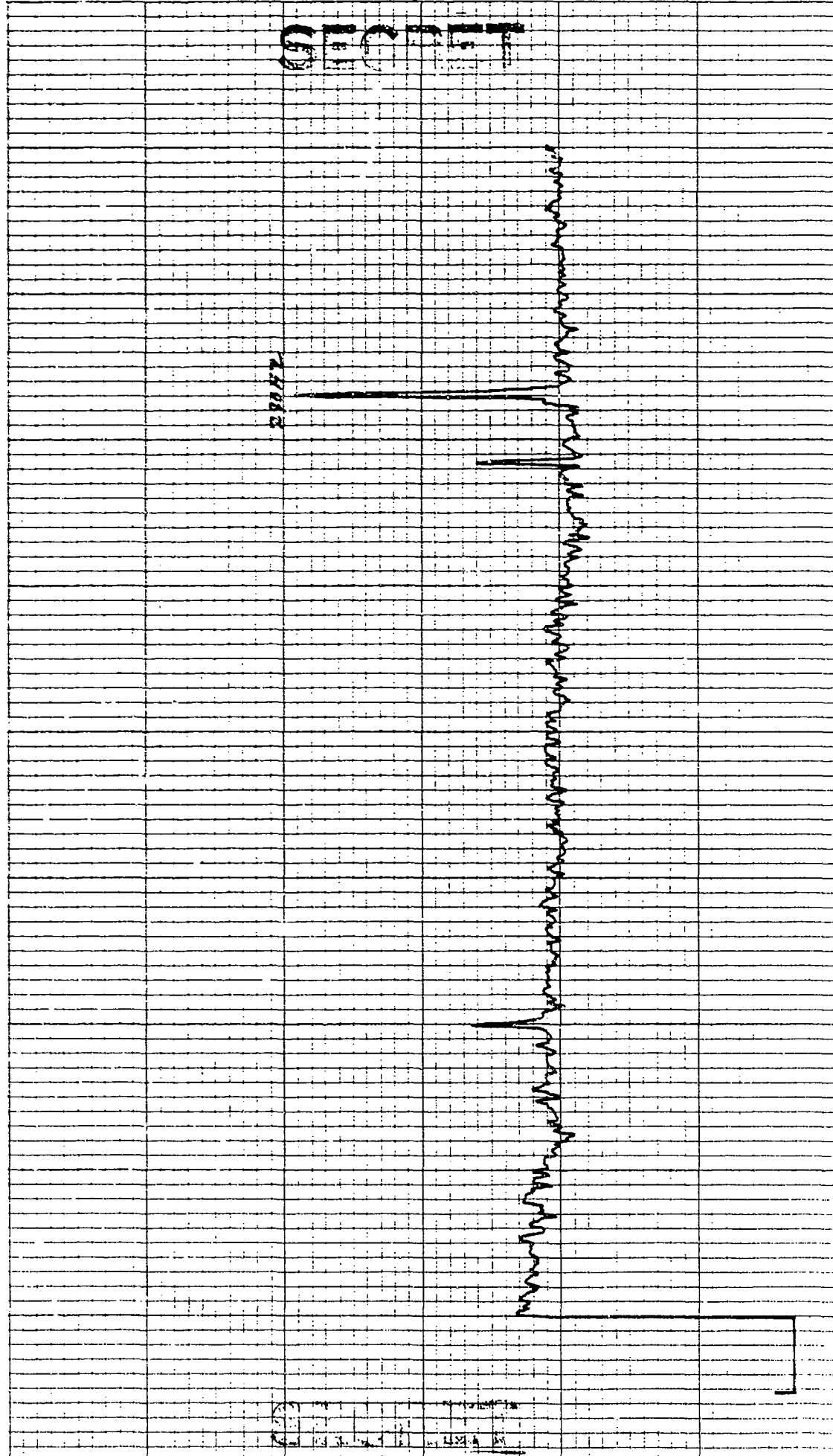


SECRET

K&E 10 X 10 TO THE INCH • 7 X 10 INCHES
KEUFFEL & ESSER CO. MADE IN U.S.A.

46 0703

CONTROL: 0935 - 51 (0911) DATE OF ANALYSIS: REEL: 1222 INDEX X 566
BEAMFORMED SPECTRUM(ELEMENTS 1-26 & 29-34) INTEGRATION TIME 320 SECS ATTN: 24 DB
EXERCISE: BEAPING STAKE FILTER WTG: HANNING
CENTER FREQ: 270 HZ ANALYSIS BANDWIDTH: 1/10 HZ
32 ELEMENTS 463 DEG. AZ STEERING



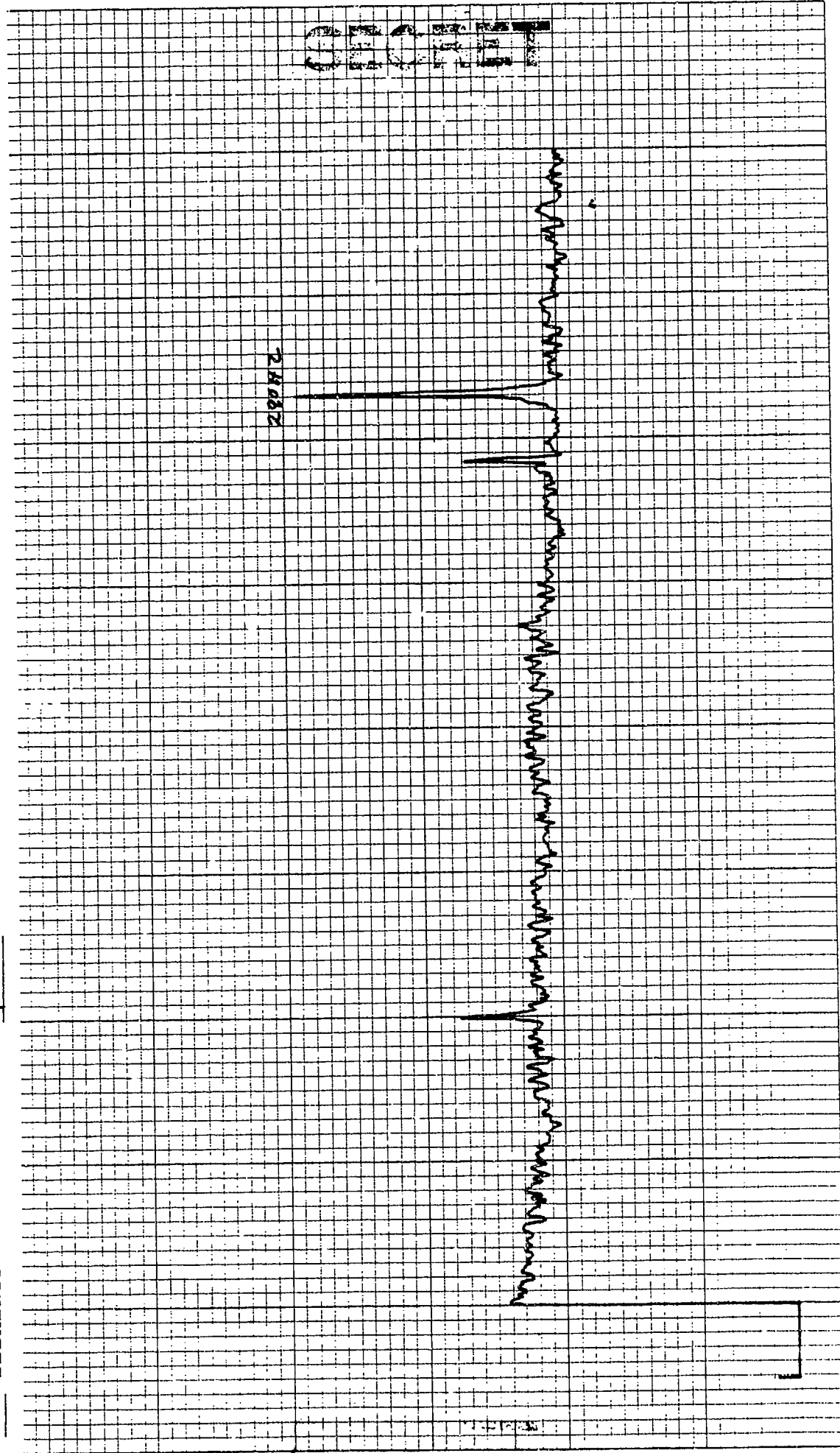
K-E 10 X 10 TO THE INCH • 7 X 10 INCHES
KEUFFEL & ESSER CO. MADE IN U.S.A.

46 0703

CONTROL: 0935 - 32 (DRII)
BEAMFORMED SPECTRUM (ELEMENTS)
EXERCISE: BEARING STAKE
CENTER FREQ: 270 HZ
32 ELEMENTS

DATE OF ANALYSIS: 1-26-77
DATE/TIME: 3-16-77 - 0935Z
ANALYSIS BANDWIDTH: 1/10HZ
+62 DEG. AZ STEERIN

REEL: 422
INDE X 566
INTEGRATION TIME 320 SECS
ATTEN: -29 DB
FILTER WTG: HANNING



KE 10 X 10 TO THE INCH • 7 X 10 INCHES
KEUFFEL & ESSER CO. MADE IN U.S.A.

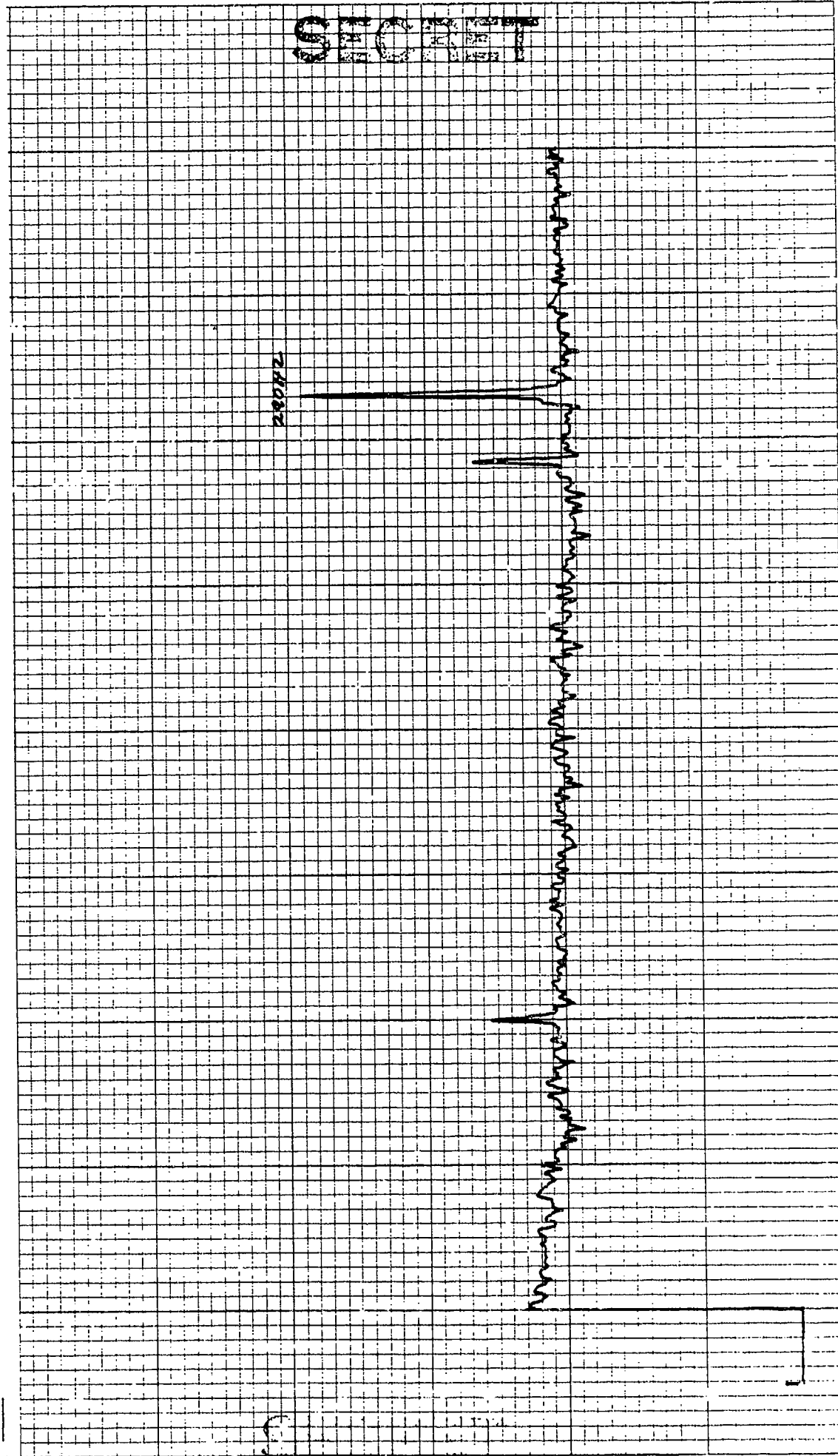
46 0703

CONTROL: 0035 - 32 (DP4)
BEAMFORMED SPECTRUM (ELEMENTS)
EXERCISE: BEARING STAKE
CENTER FREQ: 270 HZ
32 ELEMENTS

DATE OF ANALYSIS: 1-26-77
DATE/TIME: 3-16-77 - 0035 Z
ANALYSIS BANDWIDTH: 1/10 HZ
764 DEG. AZ STEERING

REEL: H22
INDE X566

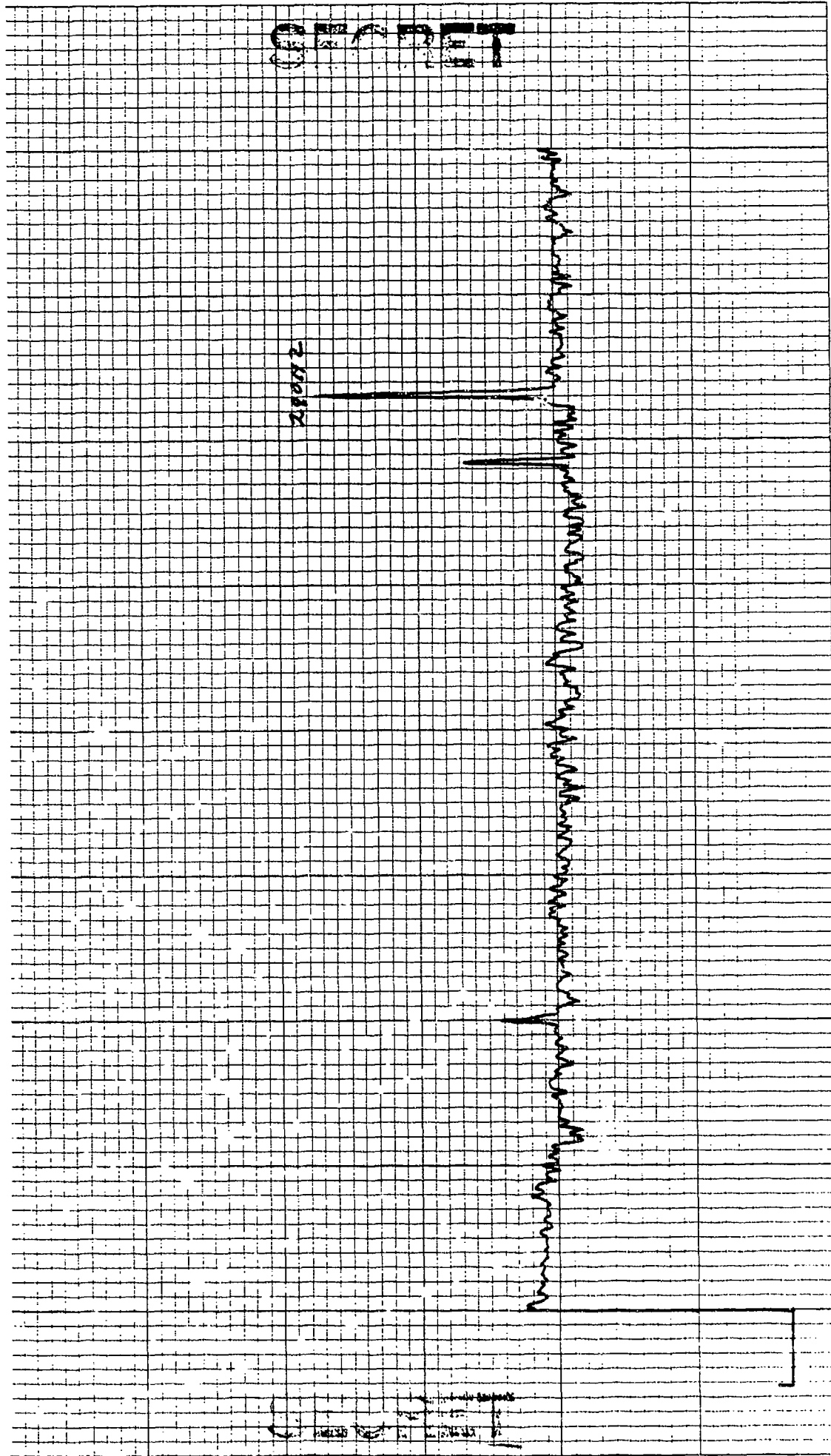
INTEGRATION TIME 320 SECS
ATTEN: -24 DB
FILTER WTG: HANNING



K-2 10 X 10 TO THE INCH • 7 X 10 INCHES
KEUFFEL & ESSER CO. MADE IN U.S.A.

46 0703

CONTROL: 0935 - 32 (DPH) DATE OF ANALYSIS: 1-26-79 REEL: 422 INDE X 565
BEAMFORMED SPECTRUM (ELEMENTS) 98-35
EXERCISE: BEARING STAKE DATE/TIME: 3-16-79 - 0935 Z INTEGRATION TIME 320 SECS ATTN: -34 DB
CENTER FREQ: 270 HZ ANALYSIS BANDWIDTH: 1/10 HZ FILTER WTG: HANNING
32 ELEMENTS +66 DEG. AZ STEERING



KSE 10 X 10 TO THE INCH • 7 X 10 INCHES
KEUFFEL & ESSER CO. MADE IN U.S.A.

46 0703

CONTROL: 0935 - 32 (DPH)
BEAMFORMED SPECTRUM (ELEMENTS)
EXERCISE: BEARING STAKE
CENTER FREQ: 270 HZ
32 ELEMENTS

DATE OF ANALYSIS: 1-26-79
DATE/TIME: 3-16-79 - 0935 Z
ANALYSIS BANDWIDTH: 1/10 HZ
+ 60 DEG. AZ STEERING

REEL: 1122 INDE X 566

INTEGRATION TIME 320 SECS
ATTEN: -24 DB
FILTER
WTG: HANNING

200000

SECRET

SECRET

CONFIDENTIAL

SIGNAL LEVEL AND SNR

CALCULATIONS

DATA POINT 11

FREQUENCY 140 HZ

NUMBER OF ELEMENTS 51

SIGNAL LEVEL

MCPS-32 SIGNAL LEVEL INDICATED		<u>-30.4</u>	
MCPS-32 CAL. CORRECTION	<u>+10</u>	<u>-20.4</u>	
BEAMFORMER GAIN	<u>+24</u>	<u>+3.6</u>	SIG. LEVEL FOR SNR CALCULATION
MRA CORRECTION	<u>+ .2</u>	<u>+3.8</u>	SIG. LEVEL FOR SIGNAL GAIN

NOISE LEVEL

MCPS-32 SIGNAL LEVEL INDICATED		<u>-57.6</u>	
MCPS-32 CAL. CORRECTION	<u>+10</u>	<u>-47.6</u>	
BEAMFORMER GAIN	<u>+24</u>	<u>-23.6</u>	NOISE LEVEL FOR SNR CALCULATION

SIGNAL-NOISE-RATIO

SIGNAL LEVEL FOR SNR		<u>+3.6</u>	
SIGNAL LEVEL FOR SNR	<u>-23.6</u>	<u>27.2</u>	
PROCESSOR CORRECTION	<u>-4.0</u>	<u>23.2</u>	
MRA CORRECTION	<u>+ .2</u>	<u>23.4</u>	SNR 1/10 HZ BAND
BANDWIDTH CONVERSION	<u>-8.2</u>	<u>15.2</u>	SNR 1 HZ BAND

CONFIDENTIAL

SIGNAL LEVEL AND SNR

CALCULATIONS

DATA POINT 11

FREQUENCY 290 HZ

NUMBER OF ELEMENTS 51

SIGNAL LEVEL

MCPS-32 SIGNAL LEVEL INDICATED	<u>-42.4</u>	
MCPS-32 CAL. CORRECTION	<u>+10</u>	-32.4
BEAMFORMER GAIN	<u>+24</u>	-8.4 SIG. LEVEL FOR SNR CALCULATION
MRA CORRECTION	<u>+ .8</u>	-7.6 SIG. LEVEL FOR SIGNAL GAIN

NOISE LEVEL

MCPS-32 SIGNAL LEVEL INDICATED	<u>-66.1</u>	
MCPS-32 CAL. CORRECTION	<u>+10</u>	-56.1
BEAMFORMER GAIN	<u>+24</u>	-32.1 NOISE LEVEL FOR SNR CALCULATION

SIGNAL-NOISE-RATIO

SIGNAL LEVEL FOR SNR	<u>-8.4</u>	
SIGNAL LEVEL FOR SNR	<u>-32.1</u>	23.7
PROCESSOR CORRECTION	<u>-4.0</u>	19.7
MRA CORRECTION	<u>+ .8</u>	20.5 SNR 1/10 HZ BAND
BANDWIDTH CONVERSION	<u>-8.2</u>	12.3 SNR 1 HZ BAND

~~CONFIDENTIAL~~

CONFIDENTIAL

DATA POINT 11

SIGNAL GAIN

	<u>140 HZ</u>	<u>290HZ</u>	<u>295HZ</u>
MEAN OMNI SIGNAL LEVEL	<u>-29.8</u>	<u>-41.4</u>	<u> </u>
MRA SIGNAL LEVEL	<u>+ 3.8</u>	<u>- 7.6</u>	<u> </u>
ARRAY SIGNAL GAIN	<u>33.6</u>	<u>33.8</u>	<u> </u>
20 LOG <u>51</u>	<u>34.1</u>	<u>34.1</u>	<u> </u>
# of elements			
DIFFERENCE	<u>- .5</u>	<u>- .3</u>	<u> </u>

ARRAY GAIN

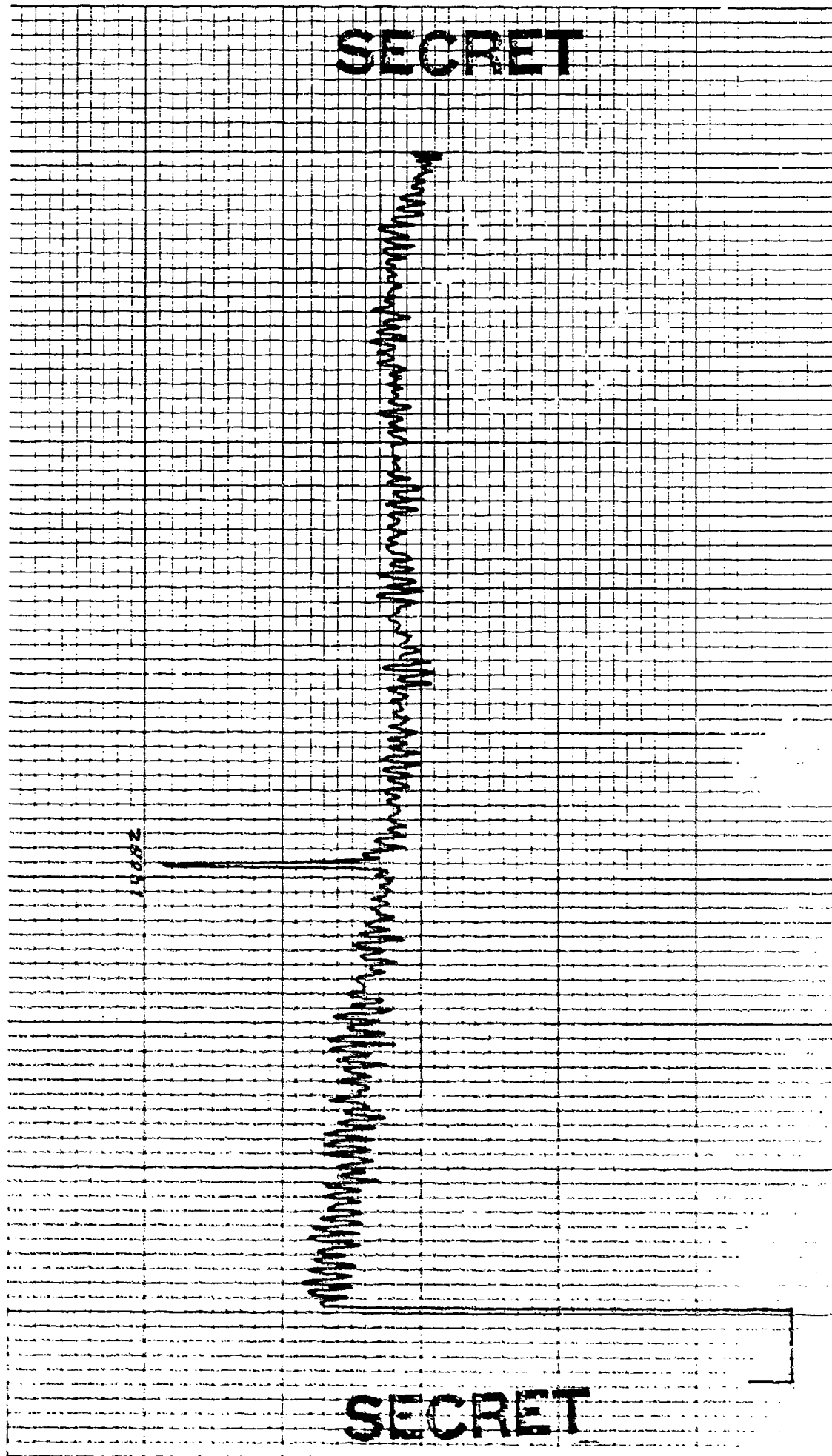
MRA SNR	<u>23.4</u>	<u>20.5</u>	<u> </u>
MEAN OMNI SNR	<u>16.2</u>	<u>8.4</u>	<u> </u>
ARRAY GAIN	<u>7.2</u>	<u>12.1</u>	<u> </u>
THEORETICAL AZMUTH GAIN (at MRA)	<u>12.4</u>	<u>14.8</u>	<u> </u>
DIFFERENCE	<u>-5.2</u>	<u>-2.7</u>	<u> </u>

CONFIDENTIAL

10 X 10 TO THE INCHES
REDFIELD & PUGH CO. MADE IN U.S.A.

46 0703

CONTROL: 0935 - 51 (DP11) REEL: N22 INDE X566
BEAMFORMED SPECTRUM(ELEMENTS)
EXERCISE: BEARING STAKE
CENTER FREQ: 150 HZ 51 ELEMENTS
DATE OF ANALYSIS: 1-26-53
DATE/TIME: 3-16-77 - 0935 Z INTEGRATION TIME 320 SECS ATTN: -24 DB
ANALYSIS BANDWIDTH: 1710 HZ FILTER WTG: HANNING
452 DEG. AZ STEERING



KOE 10 X 10 TO THE INCH • 7 X 10 INCHES
KEUFFEL & ESSER CO. MADE IN U.S.A.

46 0703

CONTROL: 0935-51 (DP11) DATE OF ANALYSIS: 1-26-89-53 REEL: N22 INDE X 566
BEAMFORMED SPECTRUM (ELEMENTS))
EXERCISE: BEARING STAKE DATE/TIME: 3-16-77 - 0935Z INTEGRATION TIME 320 SECS ATTN: -24 DB
CENTER FREQ: 250 HZ ANALYSIS BANDWIDTH: 1/10 HZ FILTER WTG: HANNING
51 ELEMENTS + 54 DEG. AZ STEERING

140 HZ

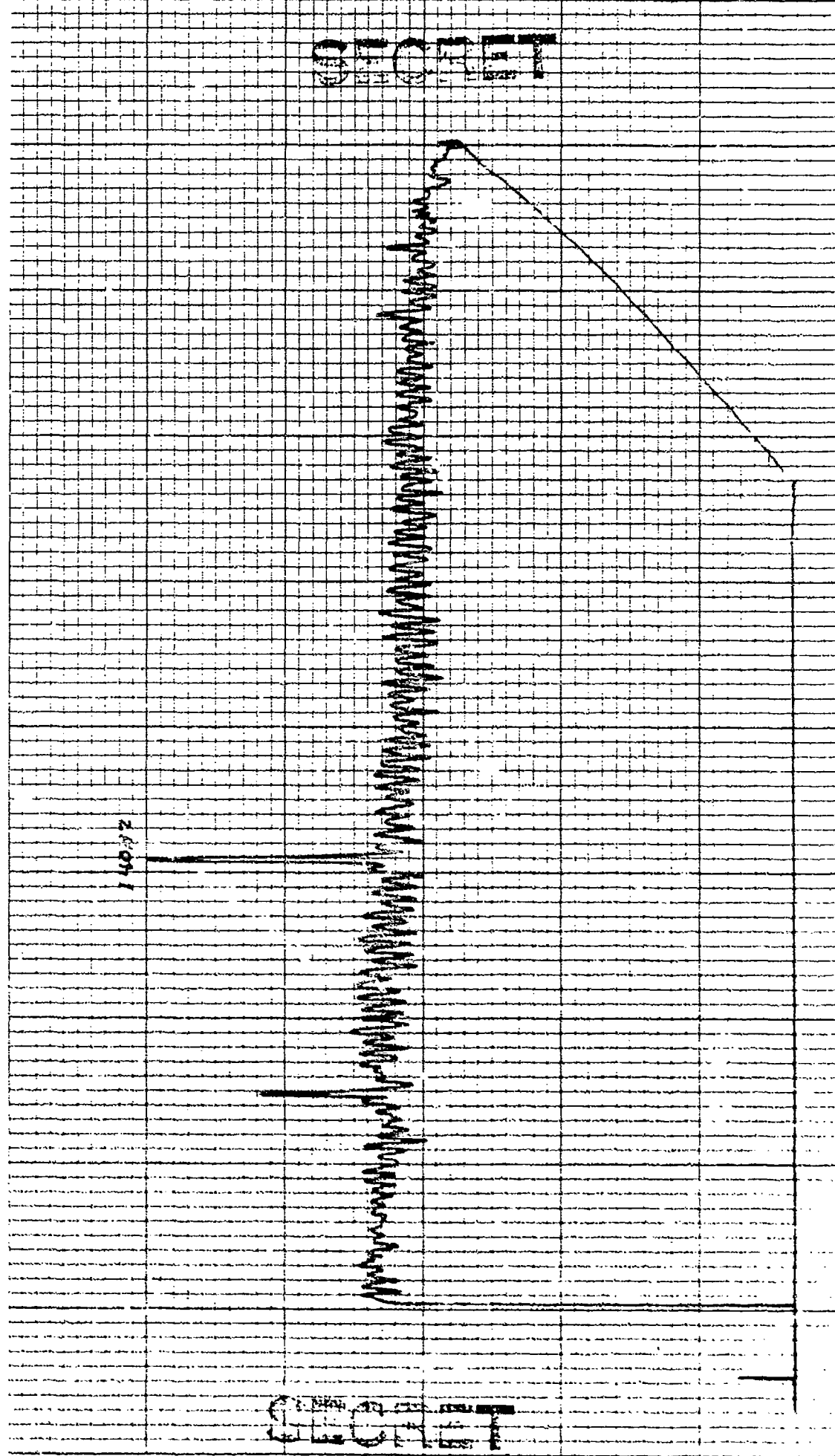
SECRET

SECRET

10 X 10 TO THE INCH 4.7 X 10 INCHES
NEUPPEL & ESSER CO. MADE IN U.S.A.

46 0703

CONTROL: 0025 - 51 (0011) DATE OF ANALYSIS: 1-26-53 REEL: 122 INDE X 566
BEAMFORMED SPECTRUM (ELEMENTS) DATE/TIME: 3-16-77-0035Z INTEGRATION TIME 320 SECS ATTN: -3Y DB
EXERCISE: BEARING STAKE ANALYSIS BANDWIDTH: 1/10HZ FILTER WTG: HANNING
CENTER FREQ: 150 HZ +56 DEG. AZ STEERING



H0Σ 10 X 10 TO THE INCH • / X 10 INCHES
KEUFFEL & ESSER CO. MADE IN U.S.A.

46 0703

CONTROL: 0035 - 51 (2011)
BEAMFORMED SPECTRUM (ELEMENTS)
EXERCISE: BEARING STAKE
CENTER FREQ: 150 HZ
51 ELEMENTS

DATE OF ANALYSIS: 1-26-53

DATE/TIME: 3:16-77 - 0035 Z

ANALYSIS BANDWIDTH: 1/10 HZ

450 DEG. AZ STEERING

REEL: A12

INDE X 566

INTEGRATION TIME 320 SECS

FILTER

ATTEN: -21 DB
WTG: HANNING

140002

SECRET

SECRET

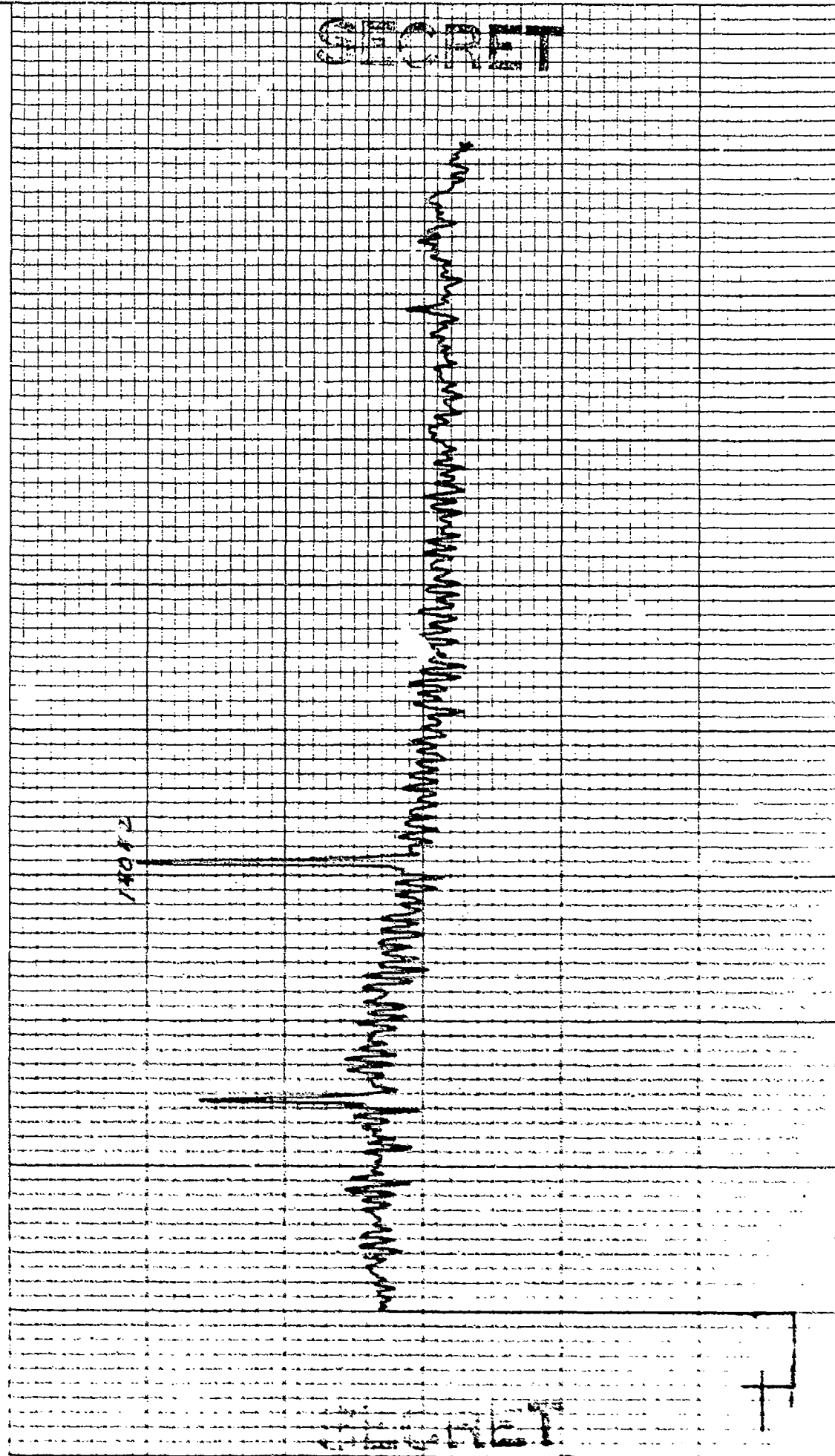
10 X 10 TO THE INCHES
RECEIVED A 10 X 10 INCHES

46 0703

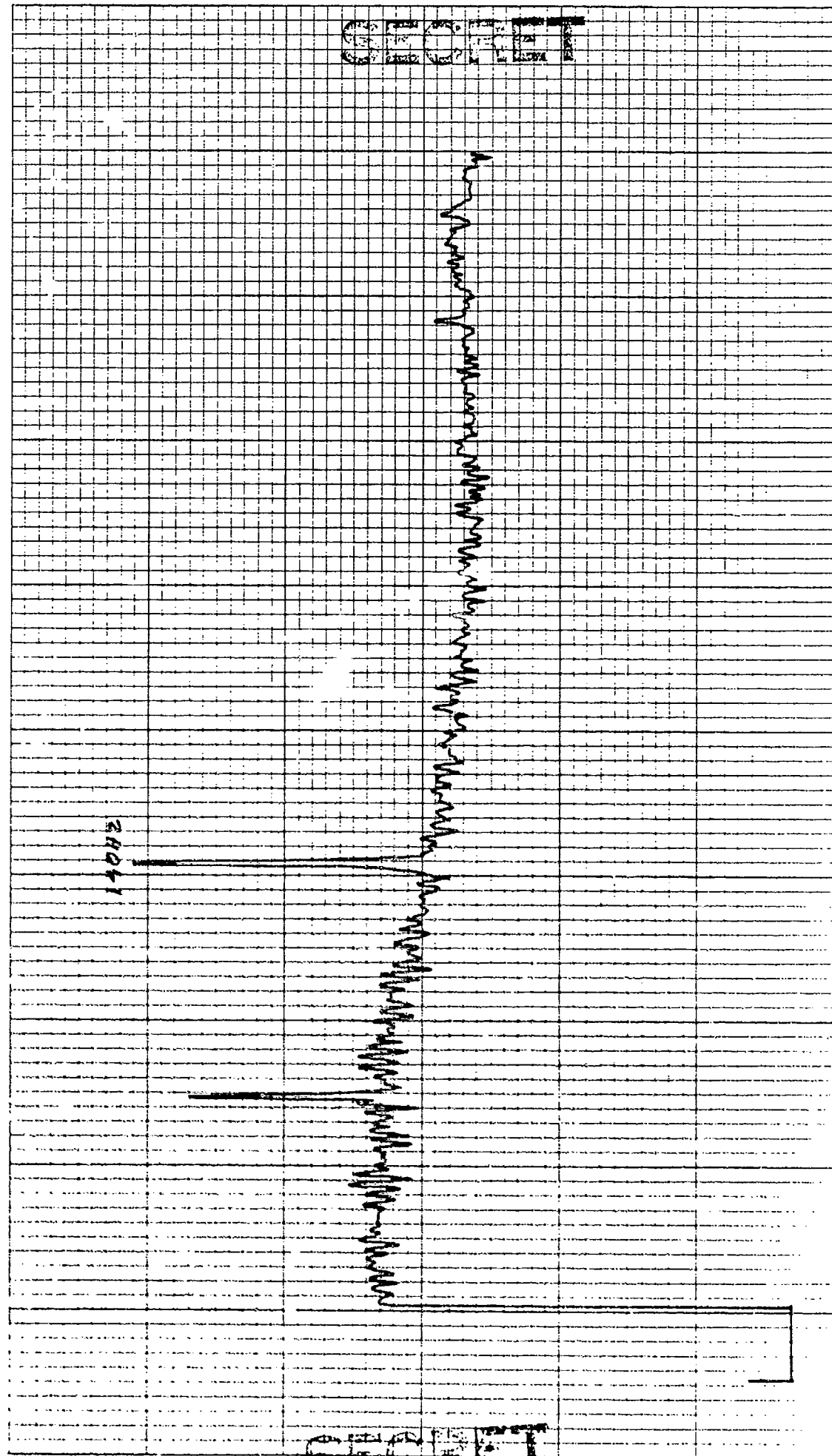
CONTROL: 0935 - 51 (2P11)
BEAMFORMED SPECTRUM (ELEMENTS)
EXERCISE: BEARING STAKE
CENTER FREQ: 150 HZ
51 ELEMENTS

DATE OF ANALYSIS: 1-26-77
DATE/TIME: 3-16-77 - 0935Z
ANALYSIS BANDWIDTH: 1/10 HZ
+60 DEG. AZ STEERING

REEL: M22
INTEGRATION TIME 320 SECS
FILTER WTG: HANNING
INDEX 566



CONTROL: 0935 - 51 (DFH) DATE OF ANALYSIS: 1-26-77-0935 Z REEL: M22 INDEX X 566
 BEAMFORMED SPECTRUM(ELEMENTS) 1-26-77-0935 Z INTEGRATION TIME 320 SECS ATTEN: 29 DB
 EXERCISE: BEARING STAKE ANALYSIS BANDWIDTH: 1/10HZ FILTER WTG: HANNING
 CENTER FREQ: 150 HZ 162 DEG. AZ STEERING



K-2 10 X 10 TO THE INCH • 7 X 12 INCHES
KEUFFEL & ESSER CO. MADE IN U.S.A.

46 0703

CONTROL: 0935 - 51 (DP11)

BEAMFORMED SPECTRUM (ELEMENTS)

EXERCISE: BEARING STAKE

CENTER FREQ: 150 HZ

51 ELEMENTS

DATE OF ANALYSIS: 1-26-77

DATE/TIME: 3-16-77 - 0935 Z

ANALYSIS BANDWIDTH: 1/10 HZ

+64 DEG. AZ STEERING

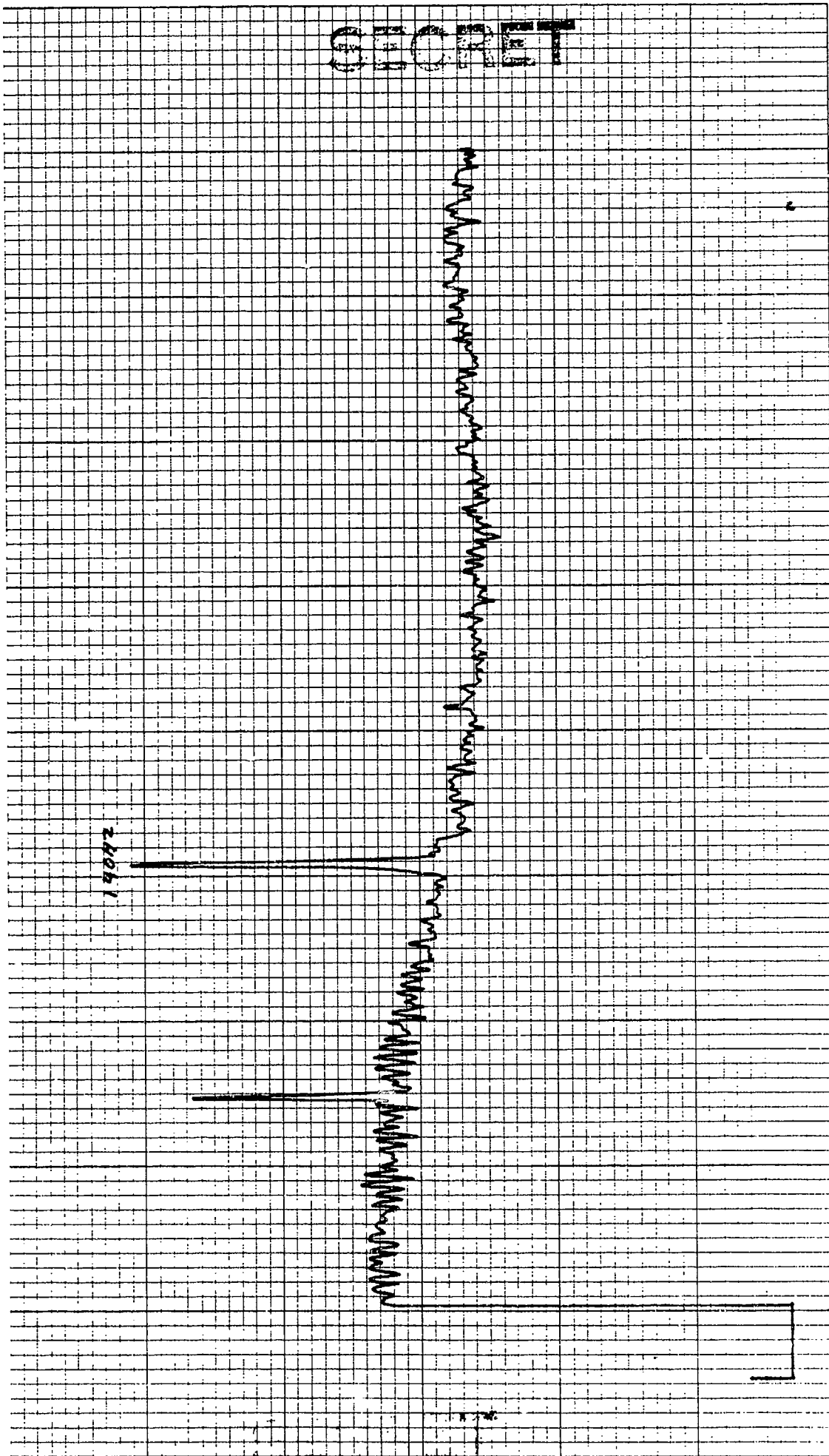
REEL: M22 INDE X 566

INTEGRATION TIME 320 SECS

FILTER

ATTEN: -34 DB

WTG: HANNING

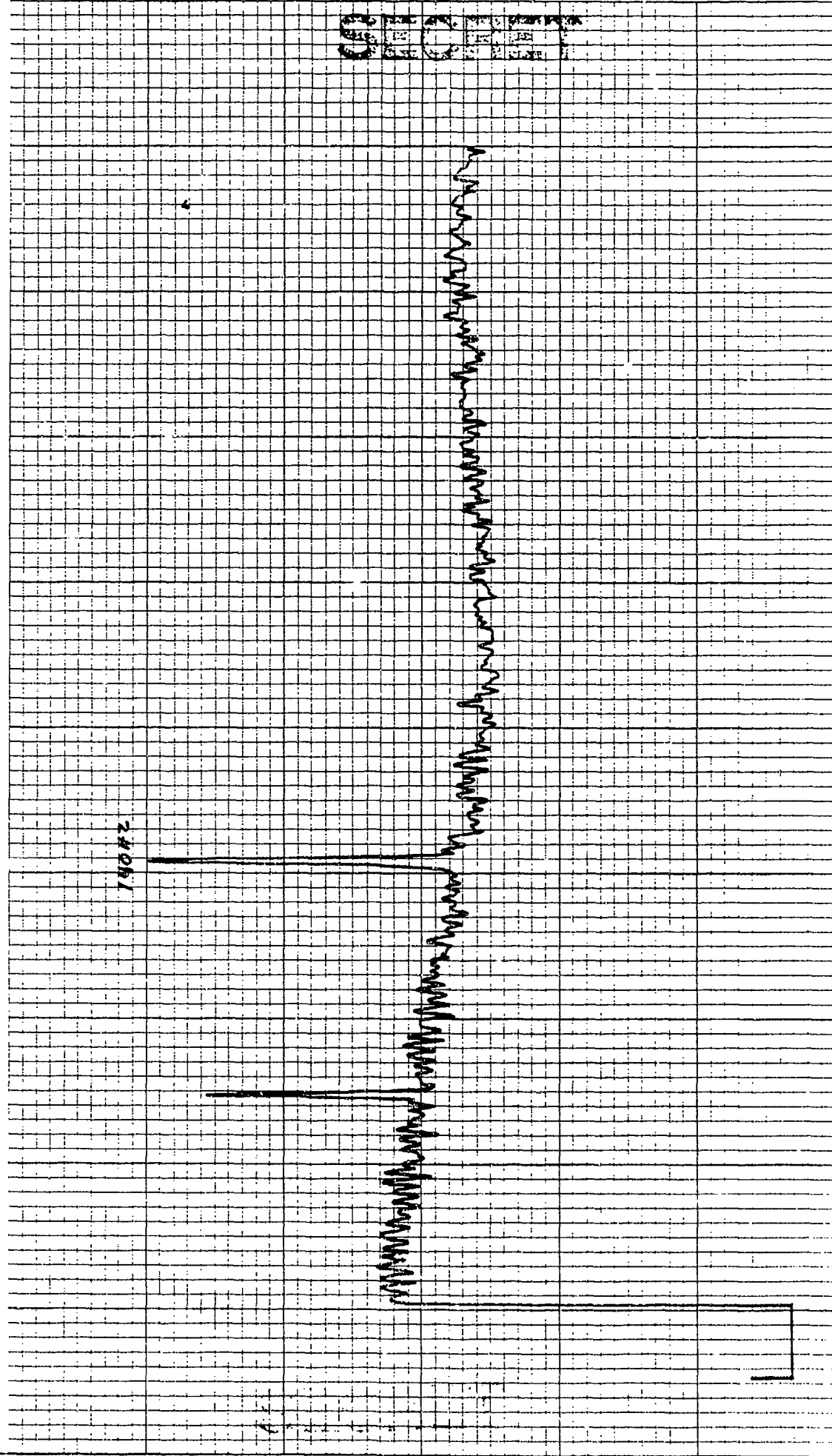


SECRET

KSE 10 X 10 TO THE INCH • 7 X 10 INCHES
KEUFFEL & ESSER CO. MADE IN U.S.A.

46 0703

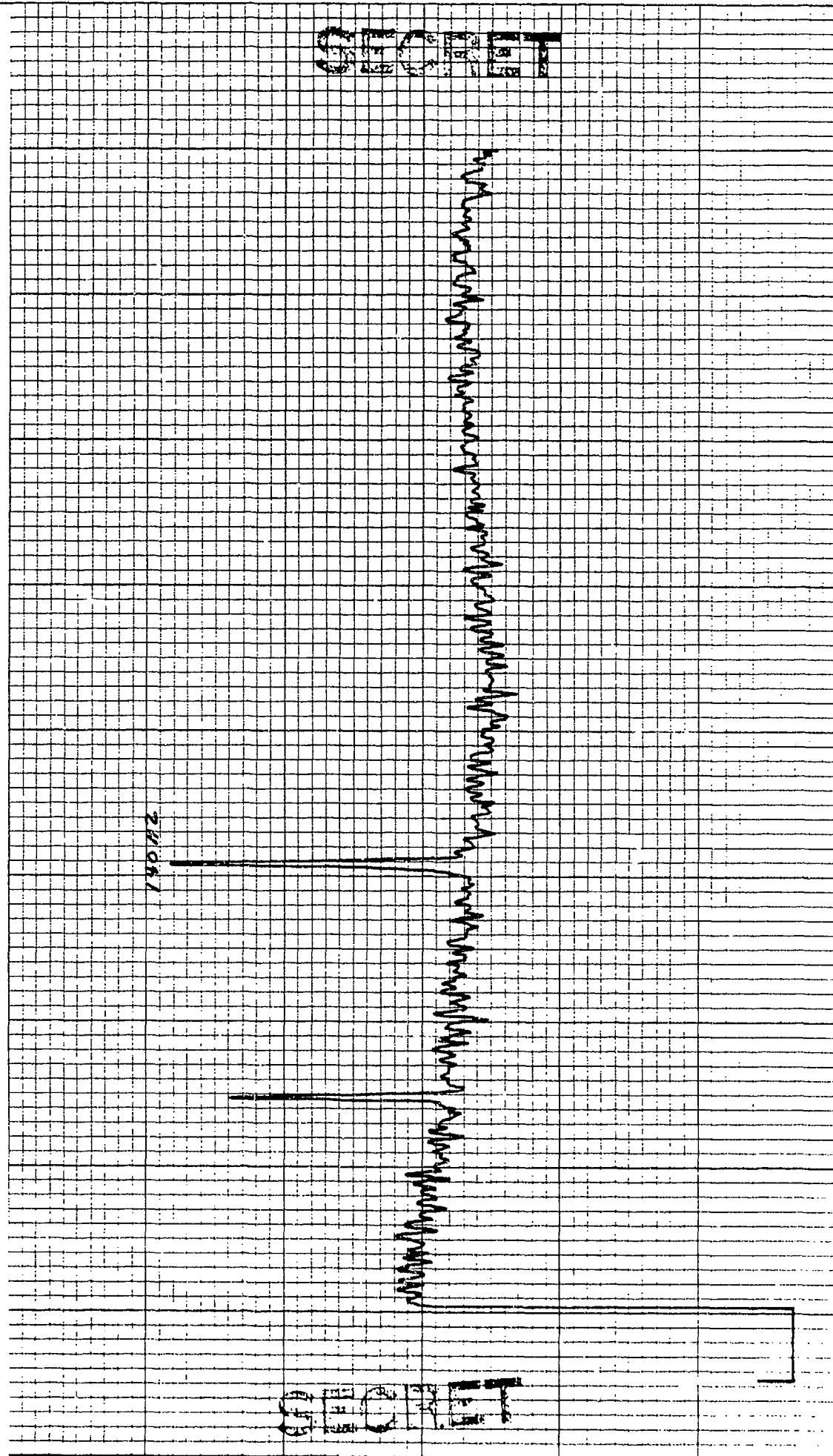
CONTROL: 0935 - 51 (DP11) DATE OF ANALYSIS: 1-26-77 REEL: 422 INDE X 566
BEAMFORMER: SPECTRUM(ELEMENTS))
EXERCISE: EARING STAKE DATE/TIME: 3-16-77 - 0935 Z INTEGRATION TIME 320 SECS ATTN: -24 DB
CENTER FREQ: 150 HZ ANALYSIS BANDWIDTH: 1/10 HZ FILTER WTG: HANNING
51 ELEMENTS +66 DEG. AZ STEERING



K-E 10 X 10 TO THE INCH • 7 X 10 INCHES
KEUFFEL & ESSER CO. MADE IN U.S.A.

46 0703

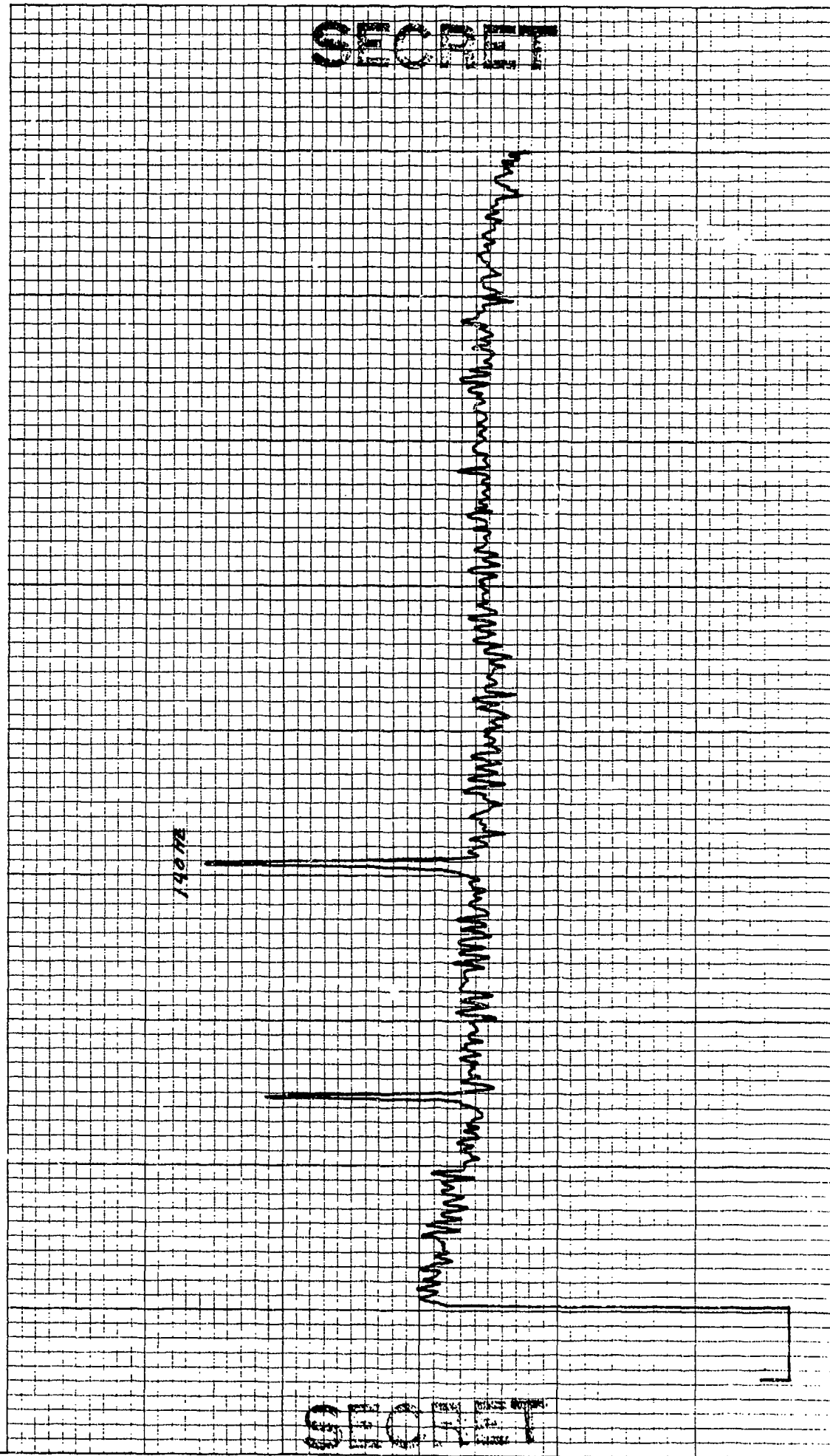
CONTROL: 0935 - 51 (DP11) DATE OF ANALYSIS: 1-26-53 REEL: 432 INDE X 566
BEAMFORMED SPECTRUM (ELEMENTS) DATE/TIME: 3-16-77 - 0935Z INTEGRATION TIME 320 SECS ATTN: 24 DB
EXERCISE: BEARING STAKE ANALYSIS BANDWIDTH: 1/10HZ FILTER WTG: HANNING
CENTER FREQ: 450 HZ +18 DEG. AZ STEERING
53 ELEMENTS



10 X 10 TO THE INCH • 7 X 10 INCHES
KEUFFEL & ESSER CO. MADE IN U.S.A.

46 0703

CONTROL: 0935-51 (2011) DATE OF ANALYSIS: 1-26-77 REEL: M22 INDEX: 566
BEAMFORMED SPECTRUM (ELEMENTS) 28-53
EXERCISE: BEARING STAKE
CENTER FREQ: 150 HZ INTEGRATION TIME: 320 SECS ATTN: -29 DB
51 ELEMENTS ANALYSIS BANDWIDTH: 1/10 HZ FILTER: WTG: HANNING
+70 DEG. AZ STEERING



46 0703

CONTROL: 0835 - 51 (DPIC)
BEAMFORMED SPECTRUM(ELEMENTS
EXERCISE: BEARING STAKE
CENTER FREQ: 270 HZ
51 ELEMENTS
DATE OF ANALYSIS: 1-26-53
DATE/TIME: 3-16-77 - 0835 Z
ANALYSIS BANDWIDTH: 1/10 HZ
+52 DEG. AZ STEERING

REEL: 422 INDEX X 516
INTEGRATION TIME 320 SECS ATTEN: -24 DB
FILTER WTG: HANNING

SECRET

24042

K.E. 10 X 10 TO THE INCH • 7 X 10 INCHES
KEUFFEL & ESSER CO. MADE IN U.S.A.

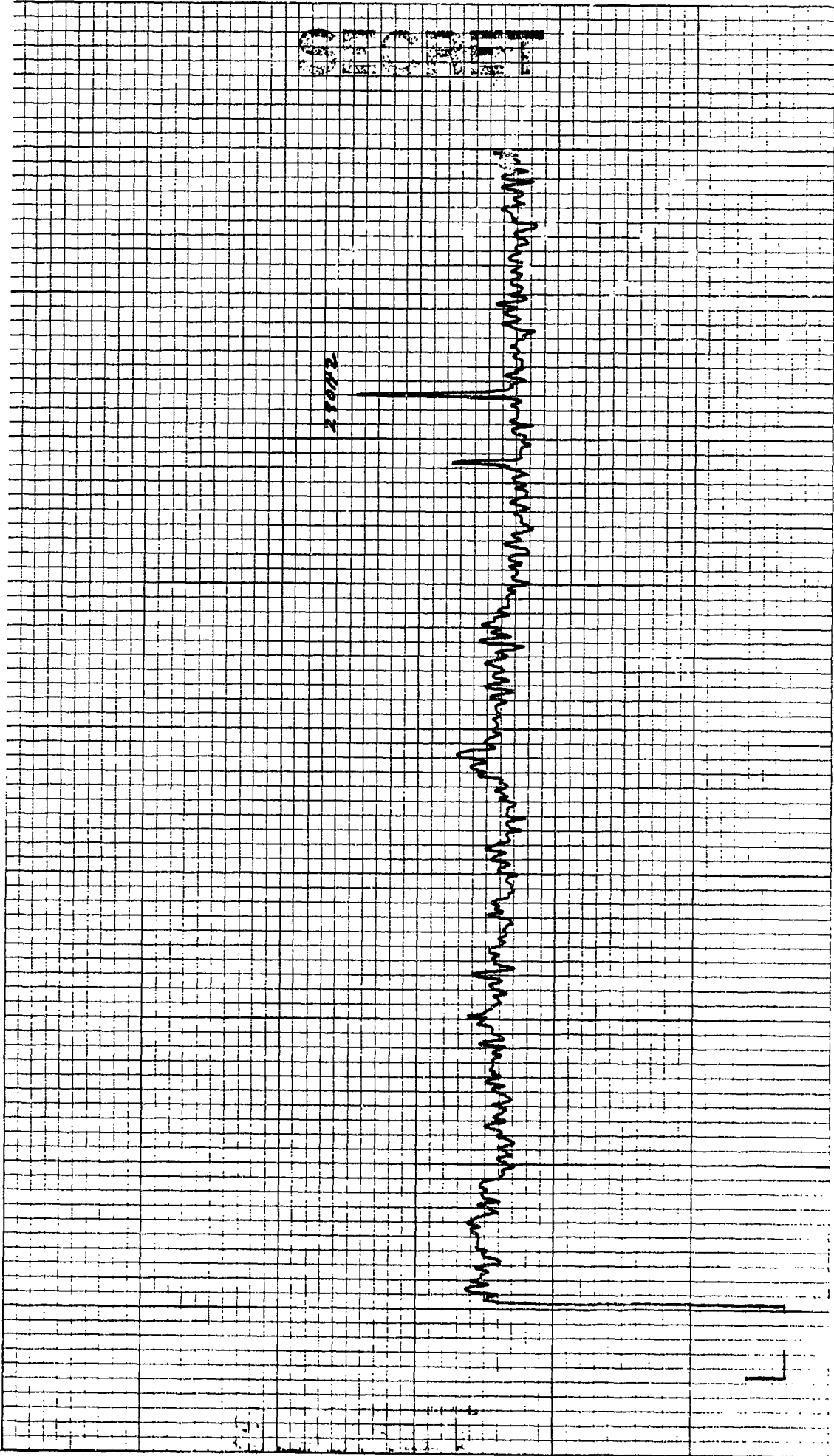
46 0703

CONTROL: 0835 - 51 (3011)
BEAMFORMED SPECTRUM (ELEMENTS)
EXERCISE: BEARING STAKE
CENTER FREQ: 270 HZ
51 ELEMENTS

DATE OF ANALYSIS: 1-26-88-53
DATE/TIME: 7-16-77 - 0835Z
ANALYSIS BANDWIDTH: 1/10HZ
+54 DEG. AZ STEERING

REEL: 122
INDE X524

INTEGRATION TIME 320 SECS
FILTER
ATTEN: -34 DB
WTG: HANNING



K-Σ 10 X 10 TO THE INCH • 7 X 10 INCHES
KEUFFEL & ESSER CO. MADE IN U.S.A.

46 0703

CONTROL: 0935 - 51 (DP11)
BEAMFORMED SPECTRUM (ELEMENTS)
EXERCISE: BEARING STAKE
CENTER FREQ: 270 HZ
51 ELEMENTS

DATE OF ANALYSIS: 1-26-53
DATE/TIME: 3-16-77 - 0935Z
ANALYSIS BANDWIDTH: 1/10HZ
+56 DEG. AZ STEERING

REEL: 1422
INDE X 566
INTEGRATION TIME 320 SECS
ATTN: -24 DB
WTG: HANNING
FILTER

SECRET

10000

SECRET

46 0703

INDEX X 575

REEL: 422

DATE/TIME: 3-16-77 - 0035Z
ANALYSIS BANDWIDTH: 1/10HZ
+ 18 DEG. AZ STEERING

INTEGRATION TIME 320 SECS ATTN:--24DB
 FILTER WTG: HANNING

5/ ELEMENTS

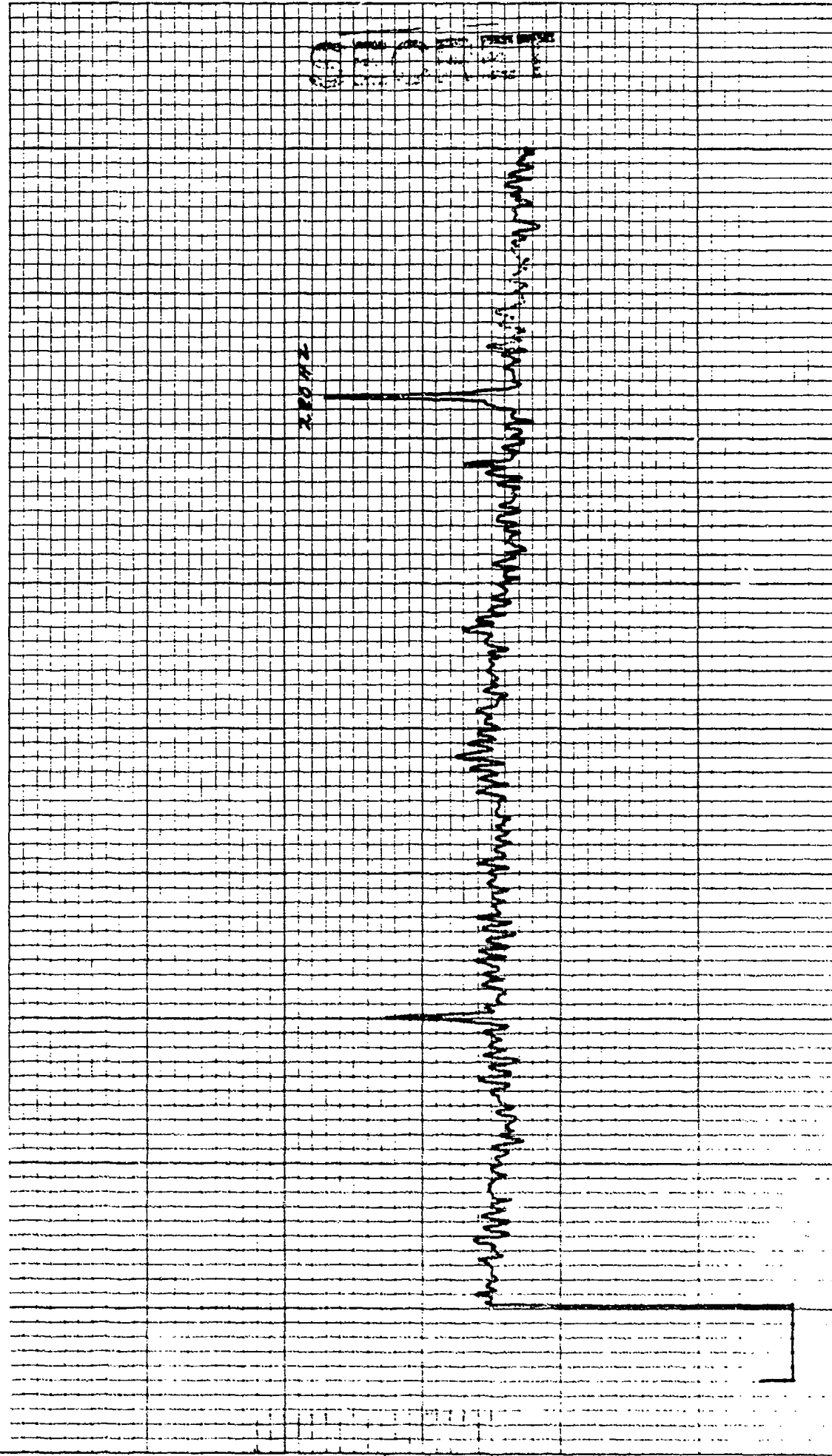
+38 DEG. AZ STEERING

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 248. Zeichnung
 249. Bild
 250. Foto
 251. Video
 252. Audio
 253.

46 0703

CONTROL: 0825 - 51 (DP11) REEL: 422 INDEX X 566
 BEAMFORMED SPECTRUM(ELEMENTS) DATE OF ANALYSIS: 1-26-53
 EXERCISE: BEARING STAKE DATE/TIME: 3-16-77 - 0835 Z ATTN: -JY DB
 CENTER FREQ: 270 HZ ANALYSIS BANDWIDTH: 1/10HZ FILTER WTG: HANNING
51 ELEMENTS 460 DEG. AZ STEERING



10 X 10 TO THE INCH • 2 X 10 INCHES
KODAK SAFETY FILM • MADE IN U.S.A.

46 0703

INDE X 566

REEL: H 12

ATTEN: -2V DB
WTG: HANNING

INTEGRATION TIME 320 SECS
FILTER

DATE OF ANALYSIS: - - - - -

1-26-53

DATE/TIME: 3-6-73 - 0235Z

ANALYSIS BANDWIDTH: 1/10HZ

+62 DEG. AZ STEERING

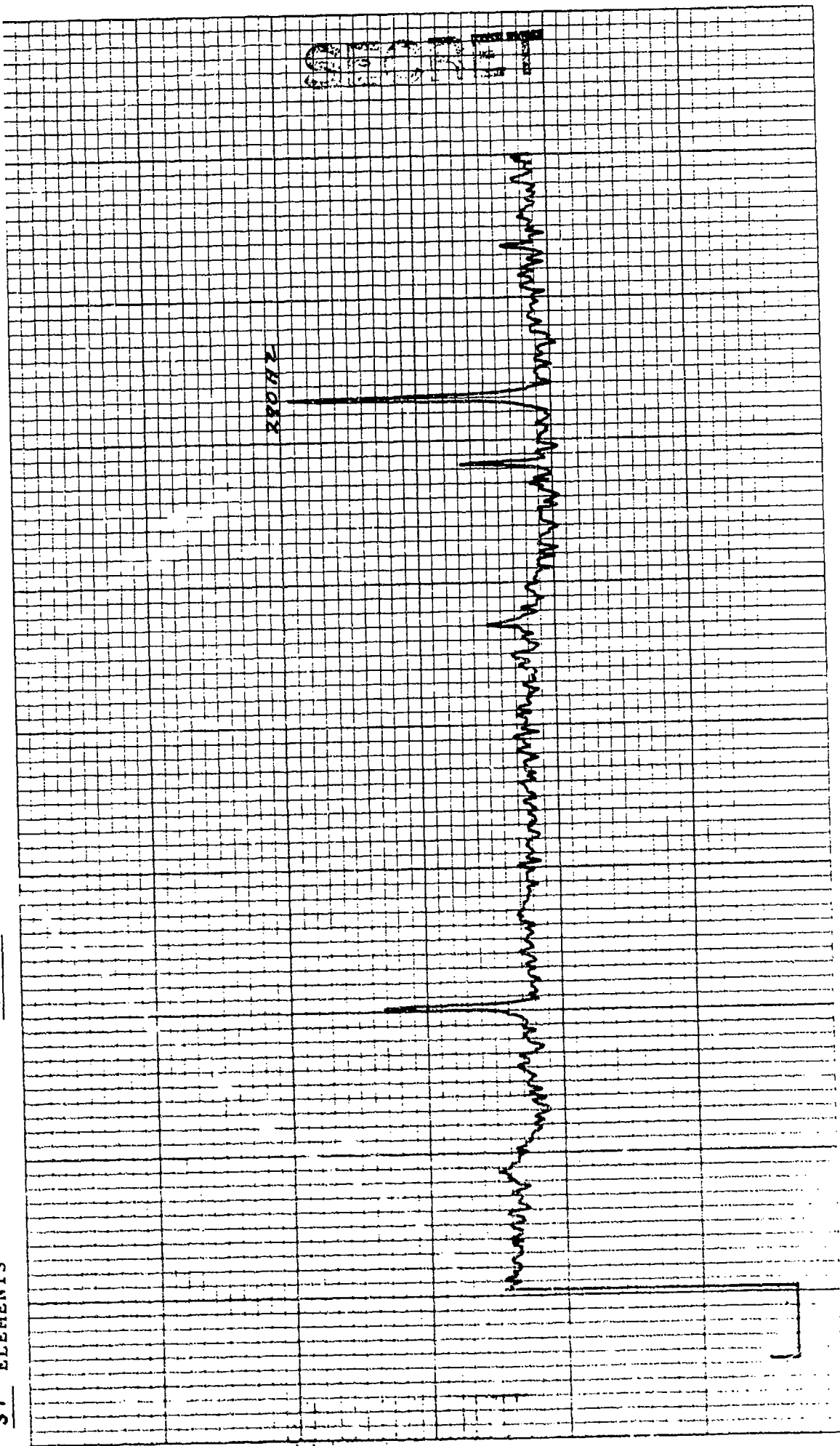
CONTROL: 0935 - 51 (DP11)

BEAMFORMED SPECTRUM (ELEMENTS

EXERCISE: BEARING STAKE

CENTER FREQ: 270 HZ

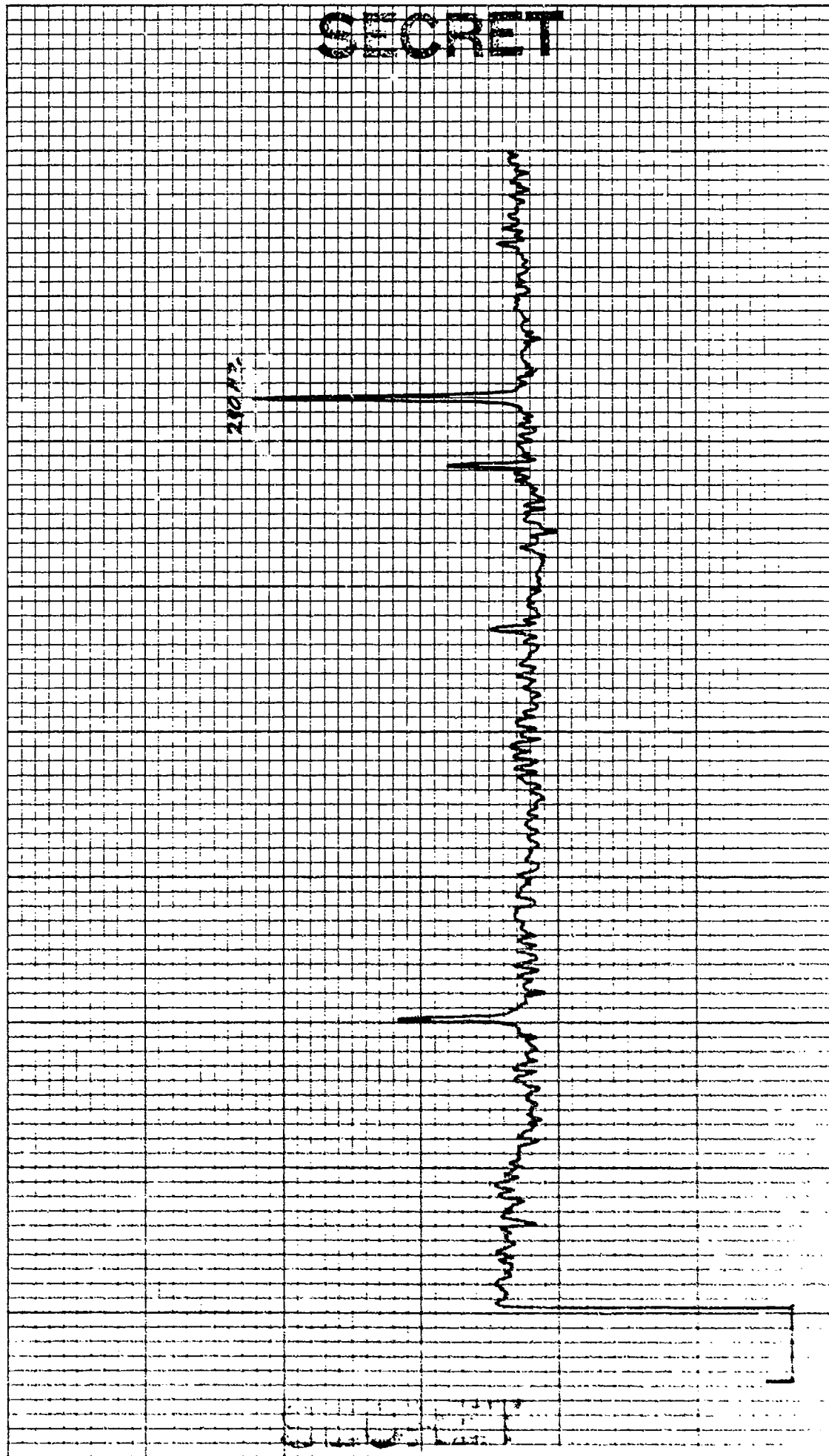
51 ELEMENTS



KSE 10 X 10 TO THE INCH • 2 X 10 INCHES
KEUWFL A ESSER CO MADE IN U.S.A.

46 0703

CONTROL: 0935 - 51 (DP11) DATE OF ANALYSIS: _____ REEL: N22 INDE X 566
BEAMFORMED SPECTRUM(ELEMENTS 1-26 & 28-53) INTEGRATION TIME 320 SECS ATTN: 24 DB
EXERCISE: BEARING STAKE FILTER WTG: HANNING
CENTER FREQ: 270 HZ ANALYSIS BANDWIDTH: 1/10HZ
51 ELEMENTS 44 DEG. AZ STEERING



10 X 10 TO THE INCH. X 10 INCHES
RECEIVED & PASSED CO. WASH DC 25

46 0703

INDE X 526

REEL: 1422

ATTEN: -YV DB
WTG: HANNING

INTEGRATION TIME 320 SECS
FILTER

DATE OF ANALYSIS: - - - - -

1-26-53

DATE/TIME: 3-16-77-0035 Z

ANALYSIS BANDWIDTH: 1/10HZ

+66 DEG. AZ STEERING

CONTROL: 0035-51 (DP11)

BEAMFORMED SPECTRUM (ELEMENTS

EXERCISE: BEARING STAKE

CENTER FREQ: 270 HZ

51 ELEMENTS

SECRET

SECRET

270 HZ

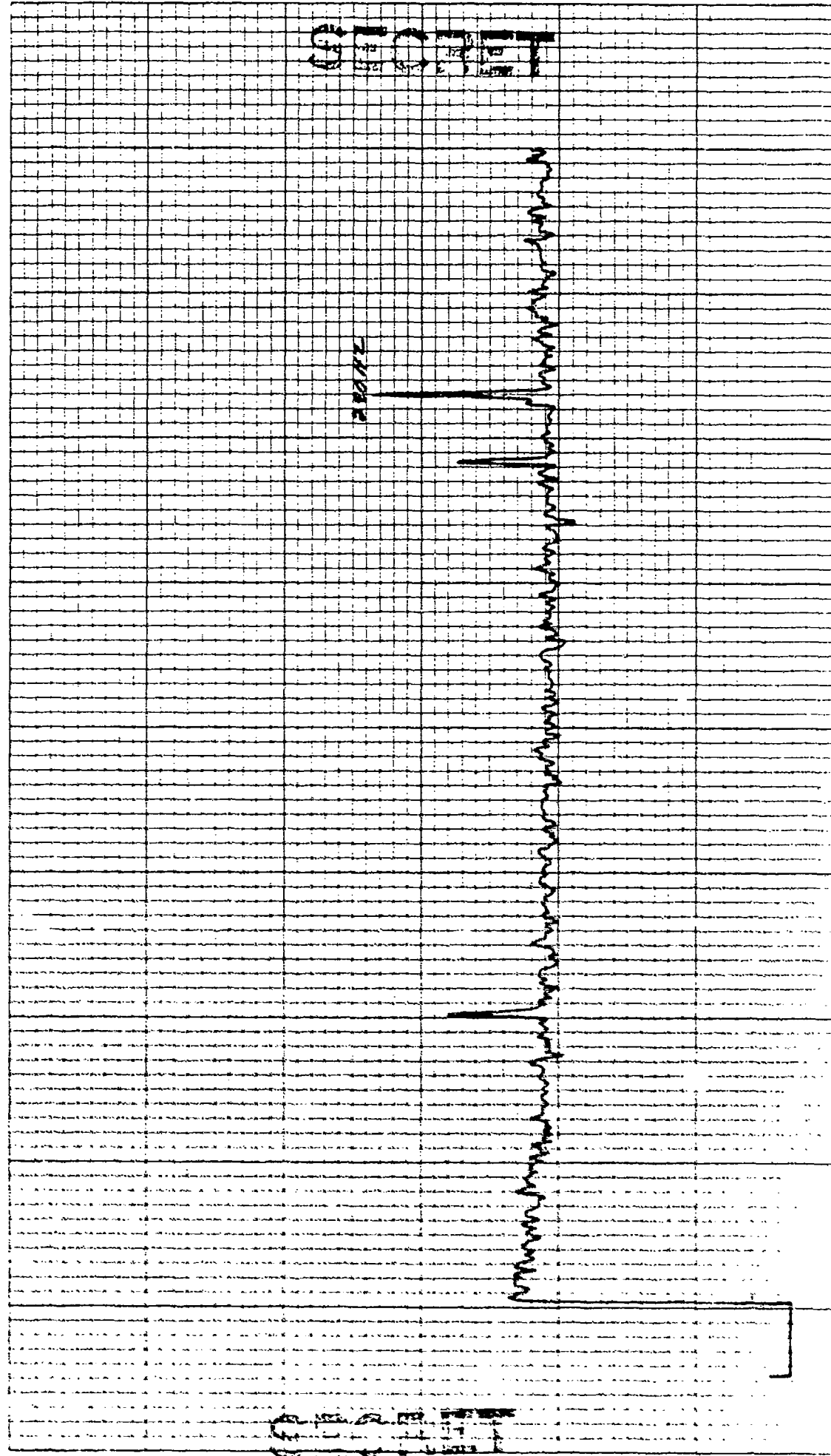


10. 10 TO TIME INCHES 1. 1. 10 INCHES
REUSE 10. 10 TO TIME INCHES 1. 1. 10 INCHES

46 0703

CONTROL: 0935 - 51 (DPH) REEL: 492 INDEX X 566
BEAMFORMED SPECTRUM (ELEMENTS) DATE OF ANALYSIS: 1-26-77
EXERCISE: BEARING STAKE DATE/TIME: 346.77 - 0935 Z
CENTER FREQ: 270 HZ ANALYSIS BANDWIDTH: 1/10 HZ
51 ELEMENTS + 60 DEG. AZ STEERING

INTEGRATION TIME 320 SECS
ATTEN: 44 DB
WTG: HANNING
FILTER



NOISE SPECTRAL DENSITY CALCULATIONS FOR SPRAY/BEARING STAKE (U)

DATA POINT 12

DATE 3-16-77

TIME 1148Z

FREQUENCY 140 HZ

INDICATED NOISE LEVEL dBV .1 HZ
ABW

-48.2 dBV

SYSTEM SENSITIVITY

dB/μB

-(-12) = -36.2

BANDWIDTH CONVERSION TO 1 HZ BAND

+82 = -28.0

CONVERSION TO dBrePa/1HZ

+100 = +72

UNCLASSIFIED

UNCLASSIFIED

NOISE SPECTRAL DENSITY CALCULATIONS FOR SPRAY/BEARING STAKE (U)

DATA POINT 12 DATE 3-16-77 TIME 1148Z

FREQUENCY 290 HZ

INDICATED NOISE LEVEL dBV .1 HZ
ABW

-50.7 dBV

SYSTEM SENSITIVITY dB/μB

- (-8) -42.7

BANDWIDTH CONVERSION TO 1 HZ BAND

+8.2 -34.5

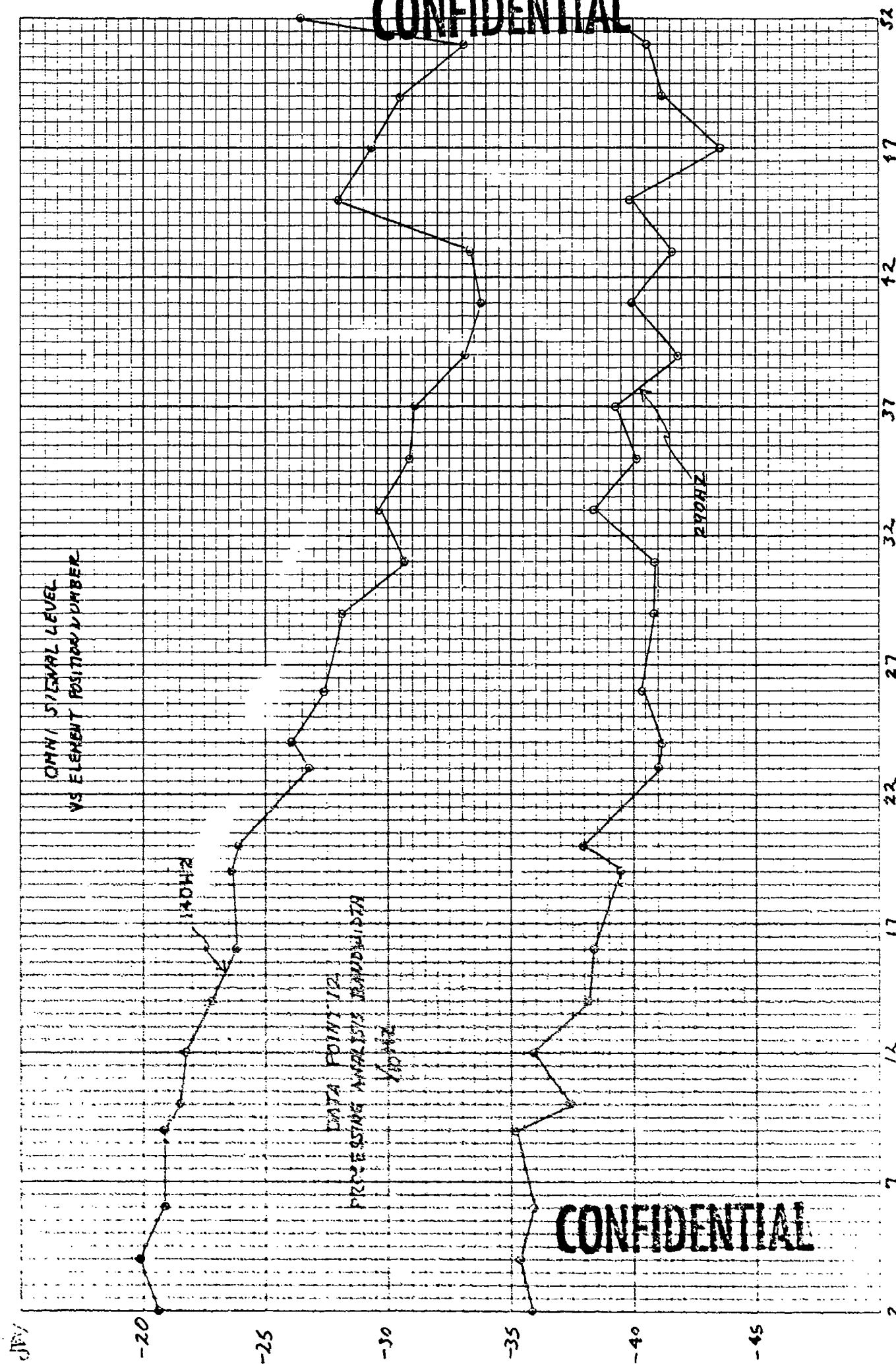
CONVERSION TO dBrePa/1HZ

+100 +65.5

UNCLASSIFIED

UNCLASSIFIED

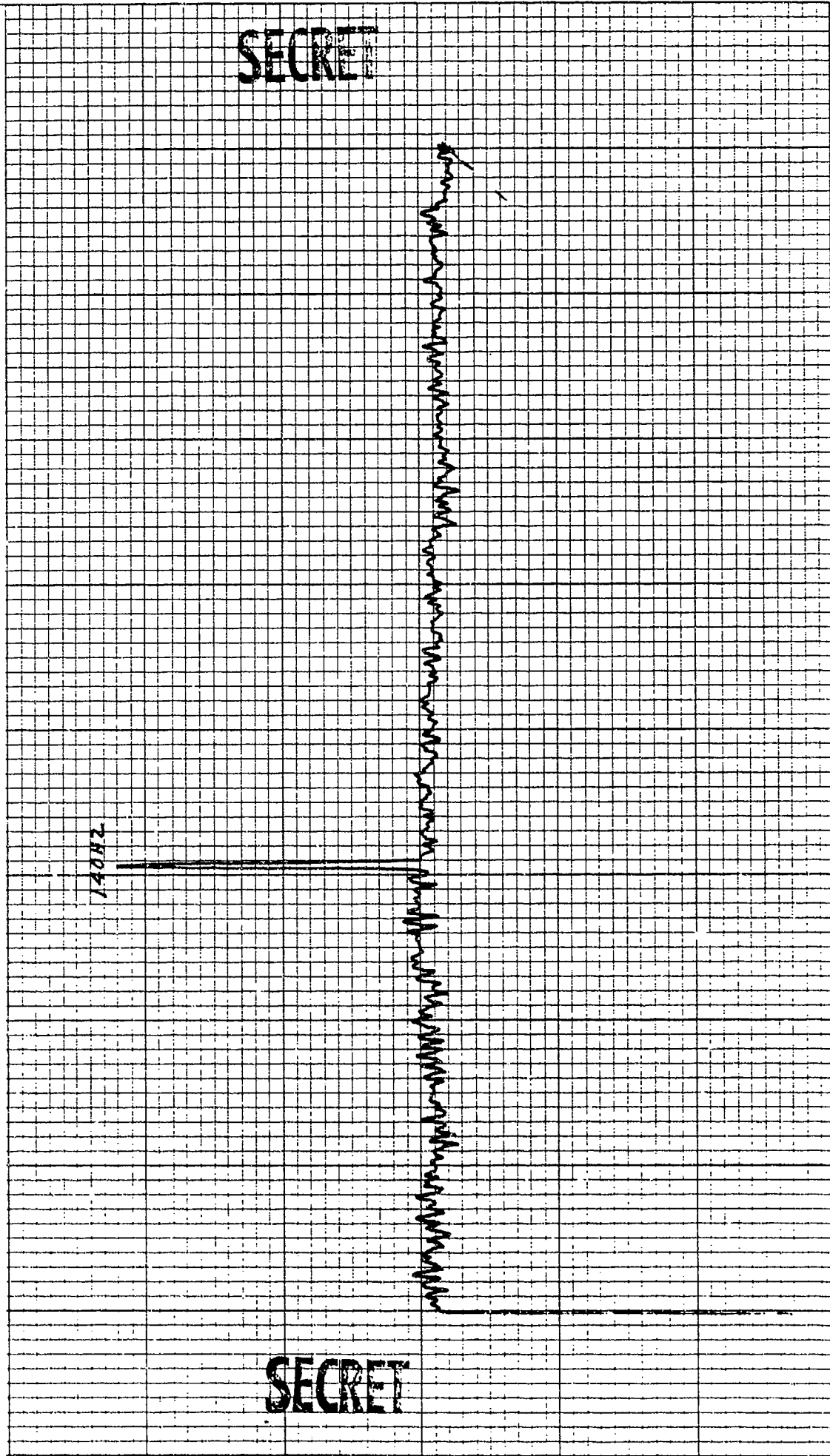
46 0703



10 X 10 TO THE INCH • 7 X 10 INCHES
KEUFFEL & ESSER CO. MADE IN U.S.A.

46 0703

CONTROL: 376-1140 (27) DATE OF ANALYSIS: REEL: A24 INDEX: 1980
OMNI SPECTRUM (ELEMENT 2)
EXERCISE: BEARING STAKE
CENTER FREQ: 150 HZ
INTEGRATION TIME 320 SECS
ATTEN: - DB
1 ELEMENT
FILT: WTG: HANNING
ANALYSIS BANDWIDTH: 1/10 HZ
DEG AZ STEERING



46 0703

INDEX/980

REEL: M24

DATE OF ANALYSIS:

EXERCISE: BEARING STAKE
CENTER FREQ: 150 HZ
1 ELEMENT
DATE/TIME: 3-16-77 - 1140 Z
ANALYSIS BANDWIDTH: 1/10HZ
DEG AZ STEERING

INTEGRATION TIME 320 SECS ATTEN: - DB
 FILTER WTG: HANNING

140 Hz

SECRET

SECRET

with the help of the following diagram:

K-Σ 10 X 10 TO THE INCH • 7 X 10 INCHES
KEUFFEL & ESSER CO. MADE IN U.S.A.

46 0703

CONTROL: 3-16 - 1146 (29)
OMNI SPECTRUM (ELEMENT 4)
EXERCISE: BEARING STAKE
CENTER FREQ: 150 HZ
1 ELEMENT

DATE OF ANALYSIS:

DATE/TIME: 3-16-77 - 1148 Z
ANALYSIS BANDWIDTH: 1/10 HZ
— DEG AZ STEERING

REEL: M24 INDEX: 1980

INTEGRATION TIME 320 SECS ATTN: - DB
FILTER WTG: HANNING

140 HZ

SECRET

SECRET

K-E 10 X 10 TO THE INCH • 7 X 10 INCHES
KEUFFEL & ESSER CO. MADE IN U.S.A.

46 0703

CONTROL: 3-16-1148 (30)
OMNI SPECTRUM (ELEMENT 9)
EXERCISE: BEARING STAKE
CENTER FREQ: 150 HZ
1 ELEMENT

DATE OF ANALYSIS:

DATE/TIME: 3-16-77 - 1148 Z

ANALYSIS BANDWIDTH: 1/10 HZ
— DEG AZ STEERING

REEL: M24 INDEX 1980

INTEGRATION TIME 320 SECS
FILTER WTG: HANNING

140 HZ

SECRET

SECRET

46 0703

CONTROL: 3-16-1140 (31)
OMNI SPECTRUM(ELEMENT 10)
EXERCISE: BEARING STAKE
CENTER FREQ: 150 HZ
1 ELEMENT

DATE OF ANALYSIS:

DATE/TIME: 3-6-77 - 1148 Z
ANALYSIS BANDWIDTH: 1/10HZ
— DEG AZ STEERING

REEL: 424
INDEX: 1980

INTEGRATION TIME 320 SECS ATTN: - DB
 FILTER WTC: HANNING

SECRET

SECRET

1. $\frac{1}{2} \frac{d}{dt} \left(\frac{1}{2} m v^2 \right) = \frac{1}{2} m v \frac{dv}{dt}$
 2. $\frac{1}{2} m v \frac{dv}{dt} = \frac{1}{2} m v \frac{dv}{dt}$
 3. $\frac{1}{2} m v \frac{dv}{dt} = \frac{1}{2} m v \frac{dv}{dt}$
 4. $\frac{1}{2} m v \frac{dv}{dt} = \frac{1}{2} m v \frac{dv}{dt}$
 5. $\frac{1}{2} m v \frac{dv}{dt} = \frac{1}{2} m v \frac{dv}{dt}$
 6. $\frac{1}{2} m v \frac{dv}{dt} = \frac{1}{2} m v \frac{dv}{dt}$
 7. $\frac{1}{2} m v \frac{dv}{dt} = \frac{1}{2} m v \frac{dv}{dt}$
 8. $\frac{1}{2} m v \frac{dv}{dt} = \frac{1}{2} m v \frac{dv}{dt}$
 9. $\frac{1}{2} m v \frac{dv}{dt} = \frac{1}{2} m v \frac{dv}{dt}$
 10. $\frac{1}{2} m v \frac{dv}{dt} = \frac{1}{2} m v \frac{dv}{dt}$

K-10 10 X 10 TO THE INCH • 7 X 10 INCHES
KEUFFEL & ESSER CO. MADE IN U.S.A.

46 0703

REEL: 124 INDEX 190

DATE OF ANALYSIS:

CONTROL: 3-16-1148 (32)
OMNI SPECTRUM (ELEMENT 12)

EXERCISE: BEARING STAKE

CENTER FREQ: 150 HZ

1 ELEMENT

DATE/TIME: 3-16-77-1148 Z

ANALYSIS BANDWIDTH: 1/10 HZ

— DEG AZ STEERING

INTEGRATION TIME 320 SECS

FILTER

ATTEN: DB
WTG: HANNING

140 HZ

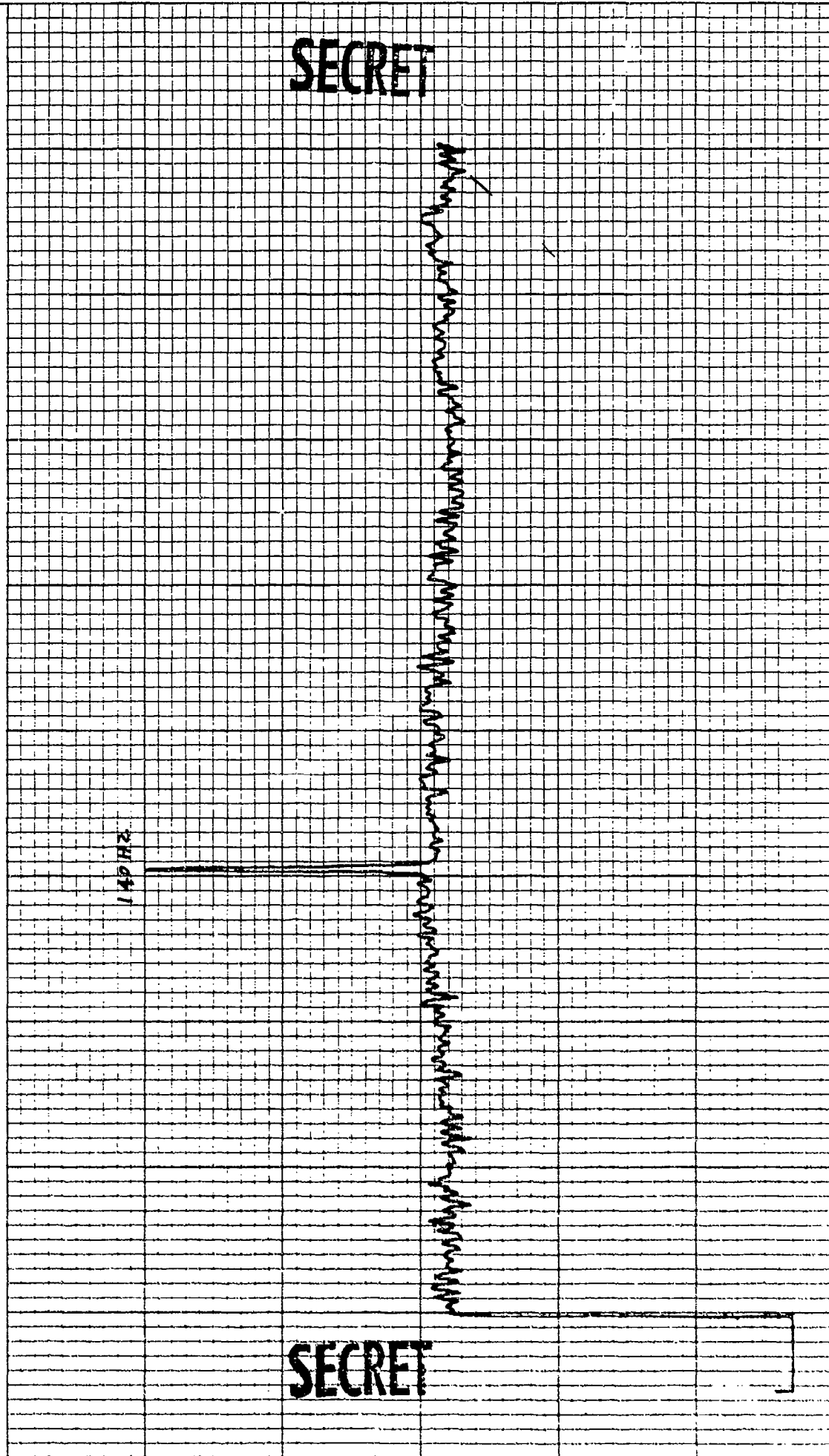
SECRET

SECRET

MSE 10 X 10 TO THE INCH • 7 X 10 INCHES
KRUPP & ESSER CO. MADE IN U.S.A.

46 0703

CONTROL: 3-16 - 1140 (33) DATE OF ANALYSIS: REEL: M24 INDEX 1980
OMNI SPECTRUM (ELEMENT 14)
EXERCISE: BEARING STAKE
CENTER FREQ: 150 HZ
1 ELEMENT
INTEGRATION TIME 320 SECS ATTN: - DB
FILTER WTG: HANNING
DATE/TIME: 3-16-77 - 1140 Z
ANALYSIS BANDWIDTH: 1/10 HZ
DEG AZ STEERING



KOE 10 X 10 TO THE INCH • 7 X 10 INCHES
KEUFEL & ESSER CO. MADE IN U.S.A.

46 0703

CONTROL: 376-1140 (34)
OMNI SPECTRUM (ELEMENT 16)
EXERCISE: BEARING STAKE
CENTER FREQ: 150 HZ
1 ELEMENT

DATE OF ANALYSIS:

DATE/TIME: 3-16-77-1140 Z

ANALYSIS BANDWIDTH: 1/10 HZ
DEG AZ STEERING

REEL: M24

INDEX 1980

INTEGRATION TIME 320 SECS ATTN: - DB
FILTER WTG: HANNING

150 HZ

SECRET

SECRET

10 X 10 TO THE INCHES
NEUFEL & FISHER CO. MADE IN U.S.A.

46 0703

CONTROL: 3-16 - 1140 (35)
OMNI SPECTRUM (ELEMENT 19)
EXERCISE: BEARING STAKE
CENTER FREQ: 150 HZ
1 ELEMENT

DATE OF ANALYSIS:

DATE/TIME: 3-16-77 - 1140 Z

ANALYSIS BANDWIDTH: 1/10 HZ
DEG AZ STEERING

REEL: M24

INDEX 1880

INTEGRATION TIME 320 SECS
FILTER
ATTEN: - DB
WTG: HANNING

150 HZ

SECRET

SECRET

46 0703

INDEX / 1980

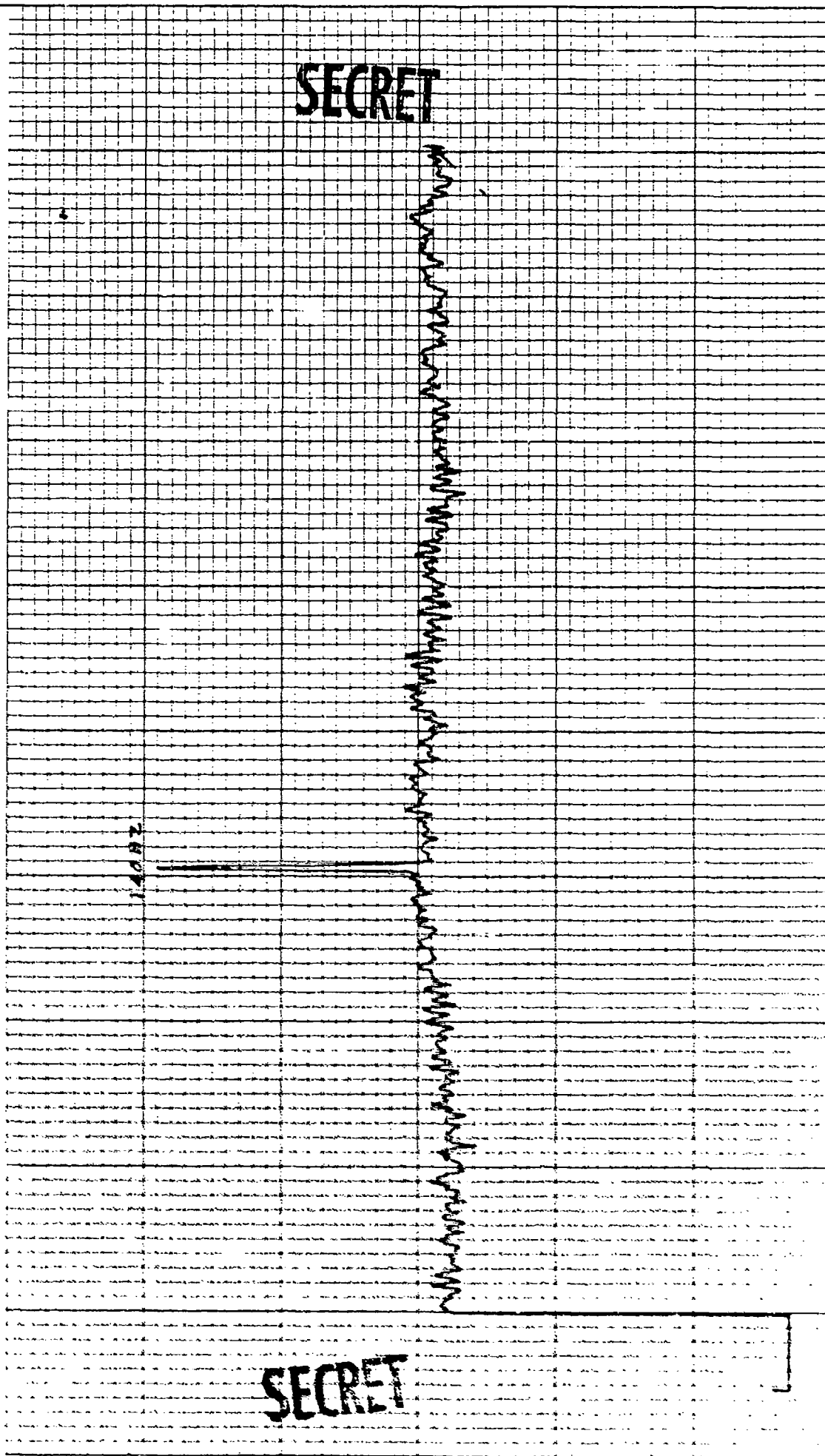
DATE OF ANALYSIS:

DATE/TIME: 3-16-77 - 1148Z
ANALYSIS BANDWIDTH: 1/10HZ

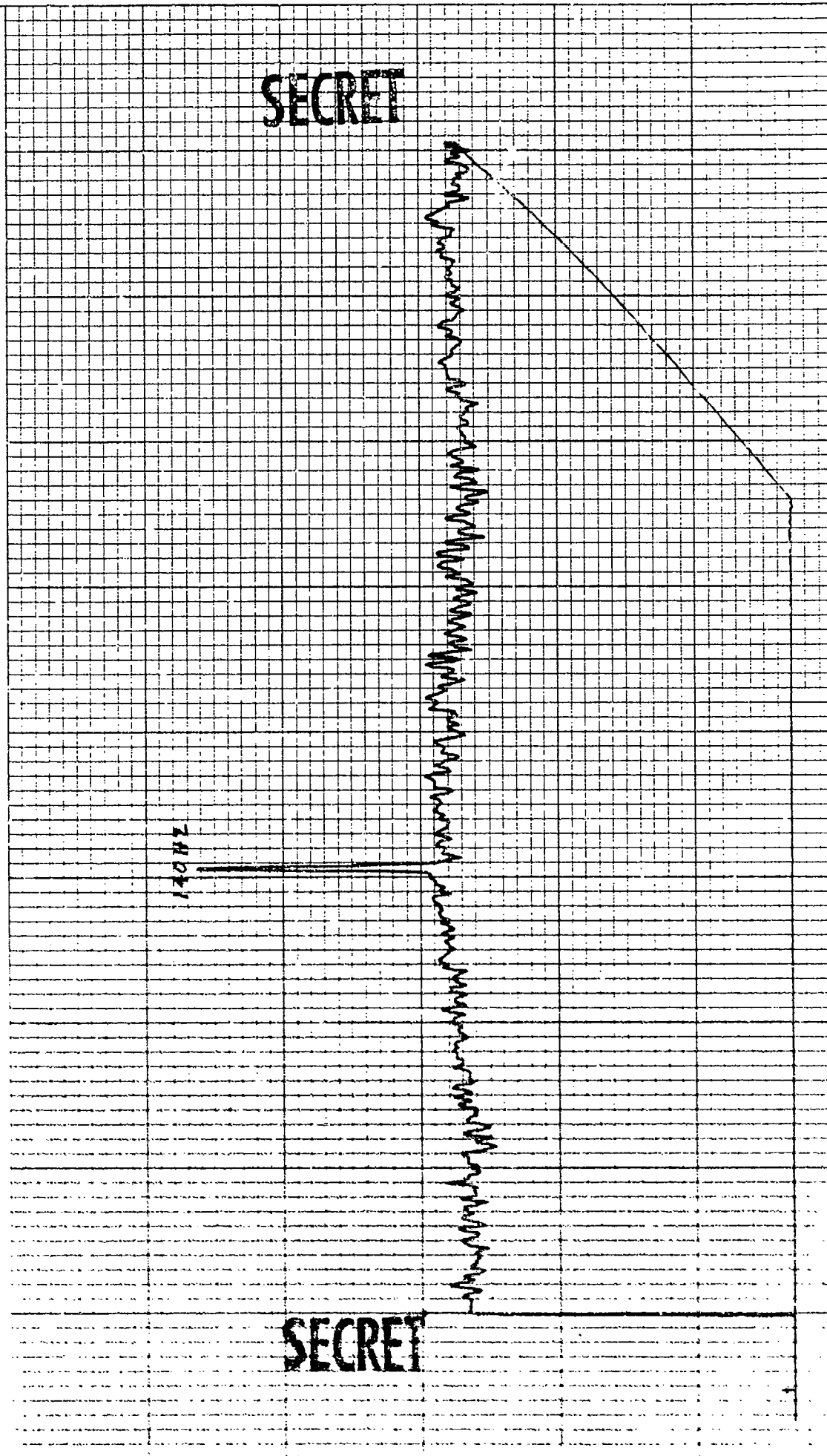
INTEGRATION TIME 320 SECS ATTN: - DB
 FILTER WTC: HANNING

SECRET

SECRET



CONTROL: 3-16 - 1148 (37) DATE OF ANALYSIS: REEL: 124 INDEX 1980
OMNI SPECTRUM (ELEMENT 23)
EXERCISE: BEARING STAKE
CENTER FREQ: 150 HZ INTEGRATION TIME 320 SECS ATTEN: - DB
1 ELEMENT FILTER WTG: HANNING
DATE/TIME: 3-16-77 - 1148Z
ANALYSIS BANDWIDTH: 1/10 HZ
— DEG AZ STEERING



KOE 10 X 10 TO THE INCH • 7 X 10 INCHES
KEUFFEL & ESSER CO. MADE IN U.S.A.

46 0703

CONTROL: 3-16-1148 (38)
OMNI SPECTRUM (ELEMENT 24)
EXERCISE: BEARING STAKE
CENTER FREQ: 150 HZ
1 ELEMENT

DATE OF ANALYSIS:

DATE/TIME: 3-16-77-1148 Z

ANALYSIS BANDWIDTH: 1/10 HZ
— DEG AZ STEERING

REEL: M24

INDEX 1980

INTEGRATION TIME 320 SECS
FILTER

ATTN: DB
WTG: HANNING

140 HZ

SECRET

SECRET

10 X 10 TO THE INCH • 7 X 10 INCHES
KEUFEL & ESSER CO. MADE IN U.S.A.

46 0703

CONTROL: 3-14-1148 (39)
OMNI SPECTRUM (ELEMENT 26)
EXERCISE: BEARING STAKE
CENTER FREQ: 150 HZ
1 ELEMENT

DATE OF ANALYSIS:

DATE/TIME: 3-16-77 -1148 Z
ANALYSIS BANDWIDTH: 1/10 HZ
— DEG AZ STEERING

REEL: M24

INDEX 1980

INTEGRATION TIME 320 SECS
ATTEN: DB
FILTER WTC: HANNING

SECRET

SECRET

1148 Z

1148 Z

10 X 10 TO THE INCH • 7 X 10 INCHES
KEUFFEL & ESSER CO. MADE IN U.S.A.

46 0703

CONTROL: 3-16-1148 (40)
OMNI SPECTRUM (ELEMENT 29)
EXERCISE: BEARING STAKE
CENTER FREQ: 150 HZ
1 ELEMENT

DATE OF ANALYSIS:

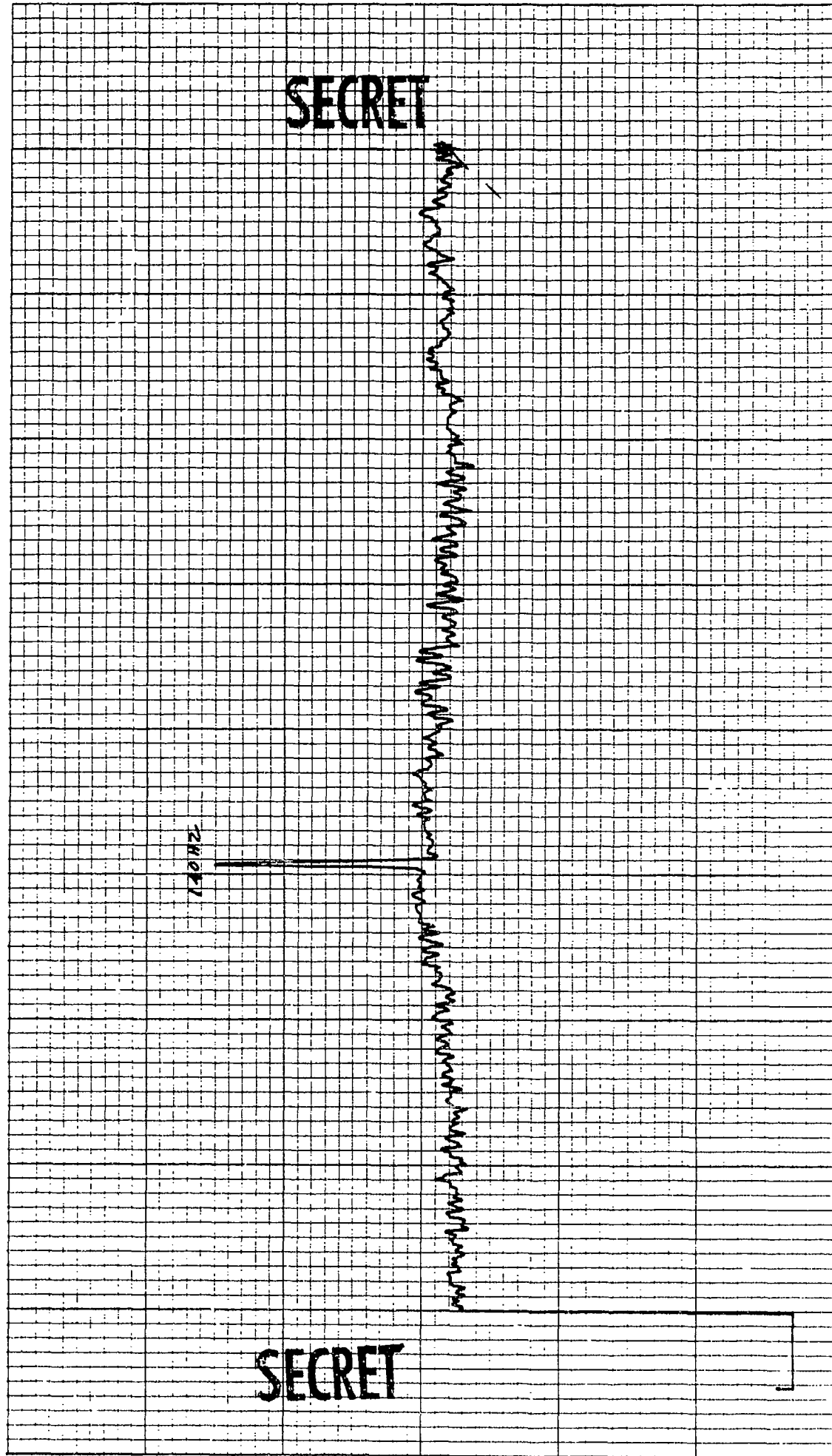
DATE/TIME: 3-16-77 - 1148 Z

ANALYSIS BANDWIDTH: 1/10 HZ
— DEG AZ STEERING

REEL: H24

INDEX: 1860

INTEGRATION TIME 320 SECS
FILTER WTC: HANNING
ATTN: — DB



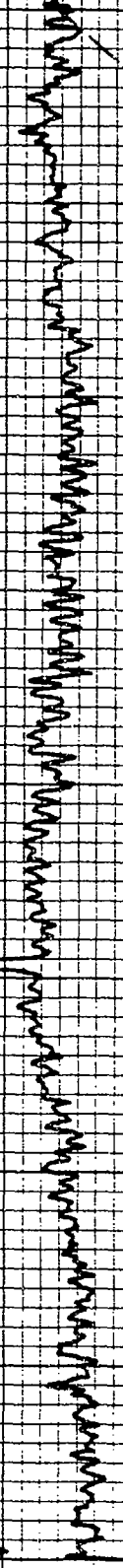
10 X 10 TO THE INCH • 7 X 10 INCHES
KEUFFEL & ESSER CO. MADE IN U.S.A.

46 0703

CONTROL: 3-6 - 1148 (41) DATE OF ANALYSIS: REEL: M24 INDEX: 1980
OMNI SPECTRUM (ELEMENT 31)
EXERCISE: BEARING STAKE
CENTER FREQ: 150 HZ
1 ELEMENT
INTEGRATION TIME 320 SECS
ATTEN: - DB
WTG: HANNING
DATE/TIME: 3-6-77 - 1148 Z
ANALYSIS BANDWIDTH: 1/10 HZ
DEG AZ STEERING

SECRET

SECRET



K-Σ 10 X 10 TO THE INCH • 7 X 10 INCHES
KEUFFEL & ESSER CO. MADE IN U.S.A.

46 0703

CONTROL: 3-16 - 1140 (42)
OMNI SPECTRUM (ELEMENT 33)
EXERCISE: BEARING STAKE
CENTER FREQ: 150 HZ
1 ELEMENT

DATE OF ANALYSIS:

DATE/TIME: 3-16-77 - 1140 Z

ANALYSIS BANDWIDTH: 1/10 HZ
— DEG AZ STEERING

REEL: 1234

INDEX: 1980

INTEGRATION TIME 320 SECS
FILTER
ATTN: — DB
WTG: HANNING

140 HZ

SECRET

SECRET

Handwritten notes in the right margin, including a large 'X' and some illegible text.

10 X 10 TO THE INCH • 7 X 10 INCHES
KEUFFEL & ESSER CO. MADE IN U.S.A.

46 0703

CONTROL: 3-16-1148 (43)
OMNI SPECTRUM (ELEMENT 35)
EXERCISE: BEARING STAKE
CENTER FREQ: 50 HZ
1 ELEMENT

DATE OF ANALYSIS:

DATE/TIME: 3-16-77 -1140 Z

ANALYSIS BANDWIDTH: 1/10 HZ
— DEG AZ STEERING

REEL: 1124

INDEX: 1980

INTEGRATION TIME 320 SECS
FILTER

ATTEN: — DB
WTG: HANNING

140 HZ

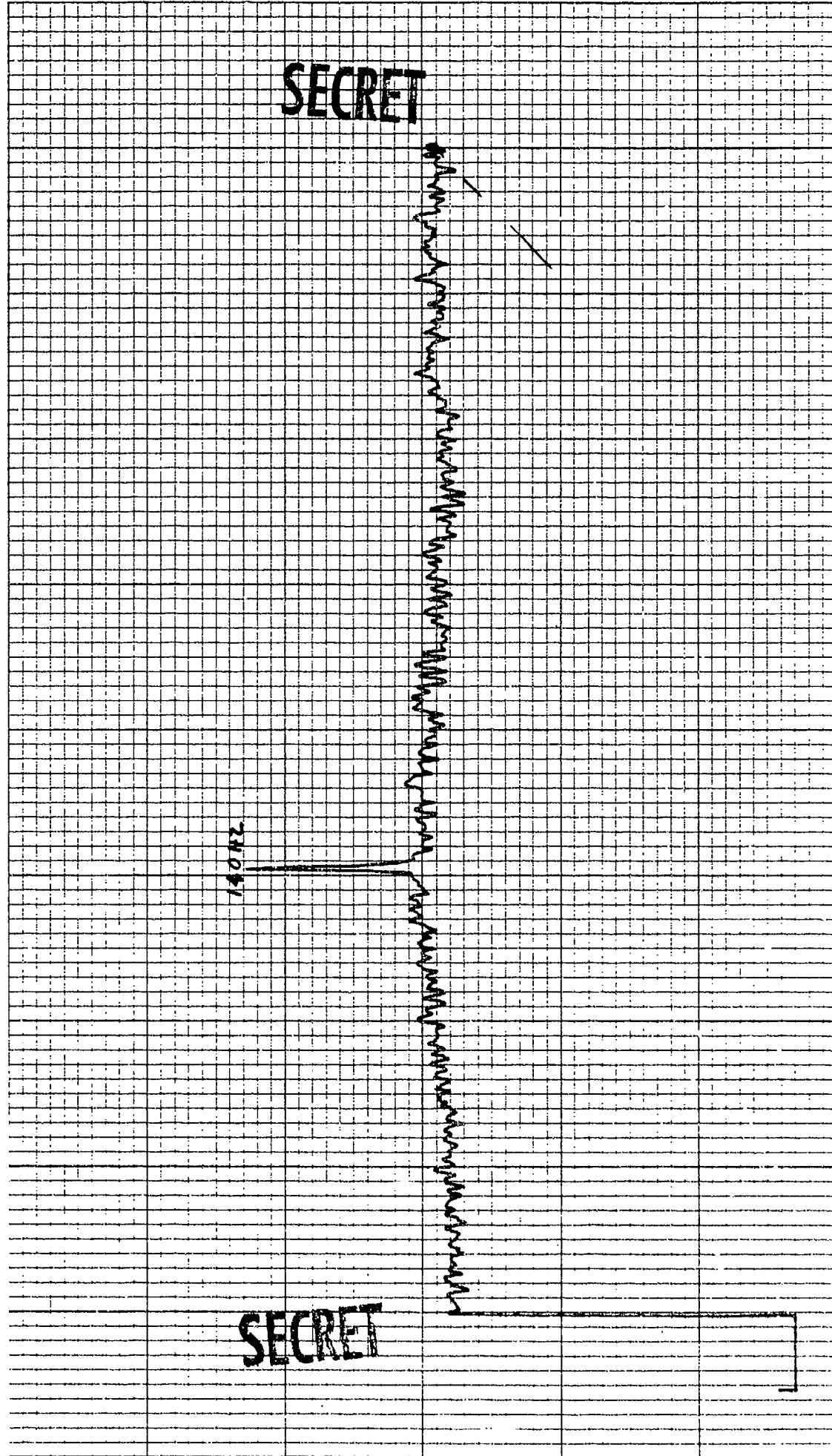
SECRET

SECRET

K-2 10 X 10 TO THE INCH • 7 X 10 INCHES
KEUFFEL & ESSER CO. MADE IN U.S.A.

46 0703

CONTROL: 3-46-1140 (44) DATE OF ANALYSIS: REEL: 424 INDEX 1980
OMNI SPECTRUM (ELEMENT 37)
EXERCISE: BEARING STAKE
CENTER FREQ: 150 HZ INTEGRATION TIME 320 SECS ATTN: - DB
1 ELEMENT - DEG AZ STEERING FILTER WTG: HANNING



KSE 10 X 10 TO THE INCH • 7 X 10 INCHES
KEUFFEL & ESSER CO. MADE IN U.S.A.

46 0703

CONTROL: 3-16 - 1148 (45)
OMNI SPECTRUM (ELEMENT 39)
EXERCISE: BEARING STAKE
CENTER FREQ: 150 HZ
1 ELEMENT

DATE OF ANALYSIS:

DATE/TIME: 3-16-77 - 1148 Z
ANALYSIS BANDWIDTH: 1/10HZ
— DEG AZ STEERING

REEL: M24

INDEX 1980

INTEGRATION TIME 320 SECS ATTN: — DB
FILTER WTG: HANNING

SECRET

140 HZ

SECRET

10 X 10 TO THE INCH 1.7 X 10 INCHES
KEUFFEL & ESSER CO. MADE IN U.S.A.

46 0703

REEL: M24 INDEX 1980

DATE OF ANALYSIS:

DATE/TIME: 3-16-77 - 1148 Z
ANALYSIS BANDWIDTH: 1/10 HZ
— DEG AZ STEERING

CONTROL: 3-16 - 1148 (46)
OMNI SPECTRUM (ELEMENT 41)
EXERCISE: BEARING STAKE
CENTER FREQ: 150 HZ
1 ELEMENT

INTEGRATION TIME 320 SECS
FILTER
ATTEN: ~ DB
WTG: HANNING

SECRET

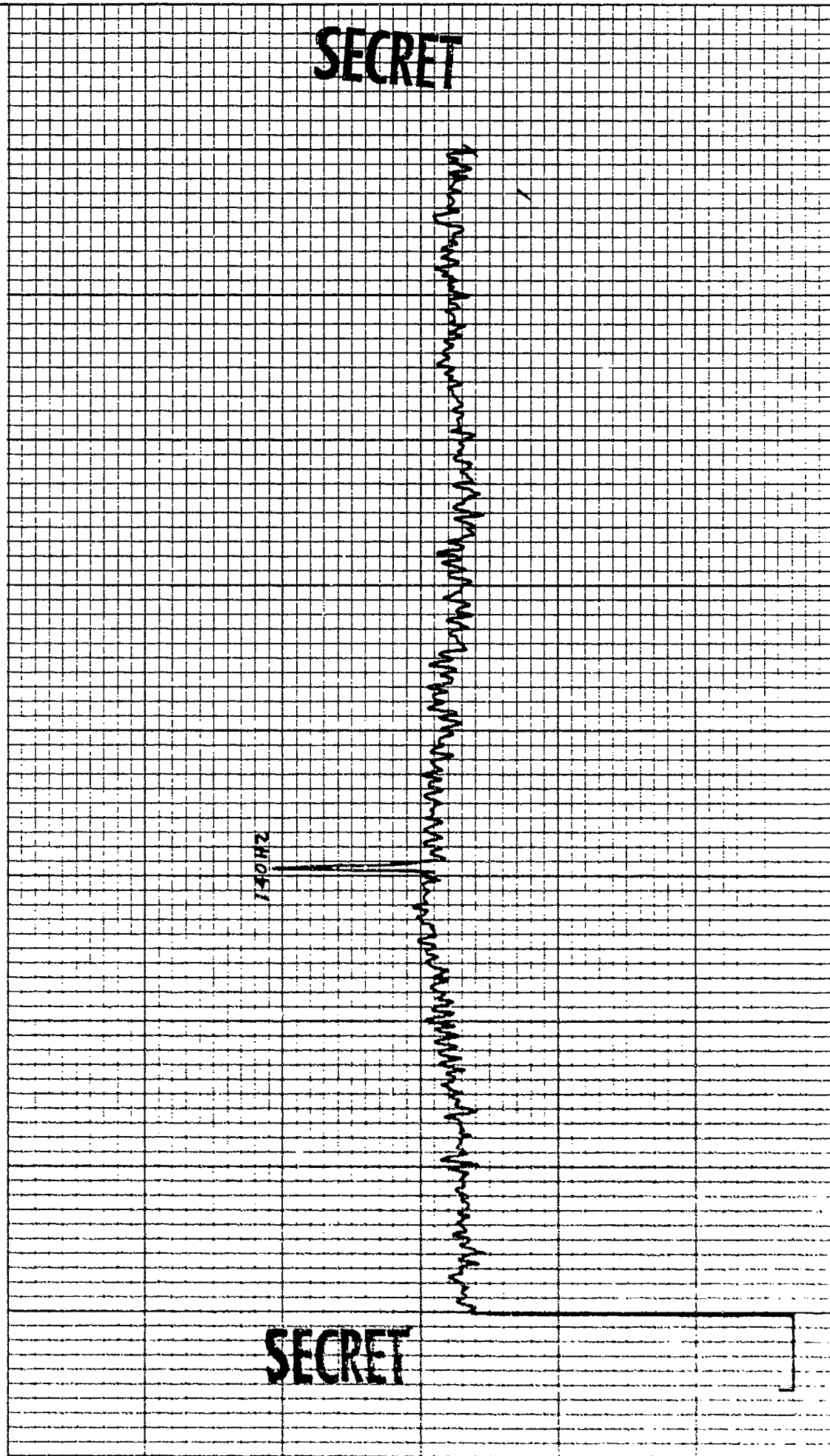
SECRET

140 Hz

K.E. 10 X 10 TO THE INCH • 7 X 10 INCHES
KEUFFEL & ESSER CO. MADE IN U.S.A.

46 0703

CONTROL: 3-16 - 1148 (47) DATE OF ANALYSIS: REEL: M24 INDEX: 1980
OMNI SPECTRUM (ELEMENT 43)
EXERCISE: BEARING STAKE
CENTER FREQ: 150 HZ INTEGRATION TIME 320 SECS ATTN: - DB
1 ELEMENT - DEG AZ STEERING FILTER WTC: HANNING



140E 10 X 10 TO THE INCH • 7 X 10 INCHES
KEUFEL & ESSER CO. MADE IN U.S.A.

46 0703

CONTROL: 3-16-1148 (40)
OMNI SPECTRUM (ELEMENT 45)
EXERCISE: BEARING STAKE
CENTER FREQ: 150 HZ
1 ELEMENT

DATE OF ANALYSIS:

DATE/TIME: 3-16-77 - 1148 Z

ANALYSIS BANDWIDTH: 1/10 HZ
DEG AZ STEERING

REEL: M24

INDEX: 1148

INTEGRATION TIME 320 SECS
FILTER WTG: HANNING

ATTN: DB
WTG: HANNING

140 HZ

SECRET

SECRET

M.E 10 X 10 TO THE INCH • 1 X 10 INCHES
KLUFFEL & ESSER CO. MADE IN U.S.A.

46 0703

CONTROL: 3-16 - 1140 (49)
OMNI SPECTRUM (ELEMENT 47)
EXERCISE: BEARING STAKE
CENTER FREQ: 150 HZ
1 ELEMENT

DATE OF ANALYSIS:

DATE/TIME: 3-16-77 - 1140 Z
ANALYSIS BANDWIDTH: 1/10 HZ
DEC AZ STEERING

REEL: M24 INDEX: 1980

INTEGRATION TIME 320 SECS
ATTEN: - DB
FILTER WTG: HANNING

1140 HZ

SECRET

SECRET

160E 10 X 10 TO THE 1000 HZ X 10 HZ
REUPPEL & GESSER CO. WIND 1012

46 0703

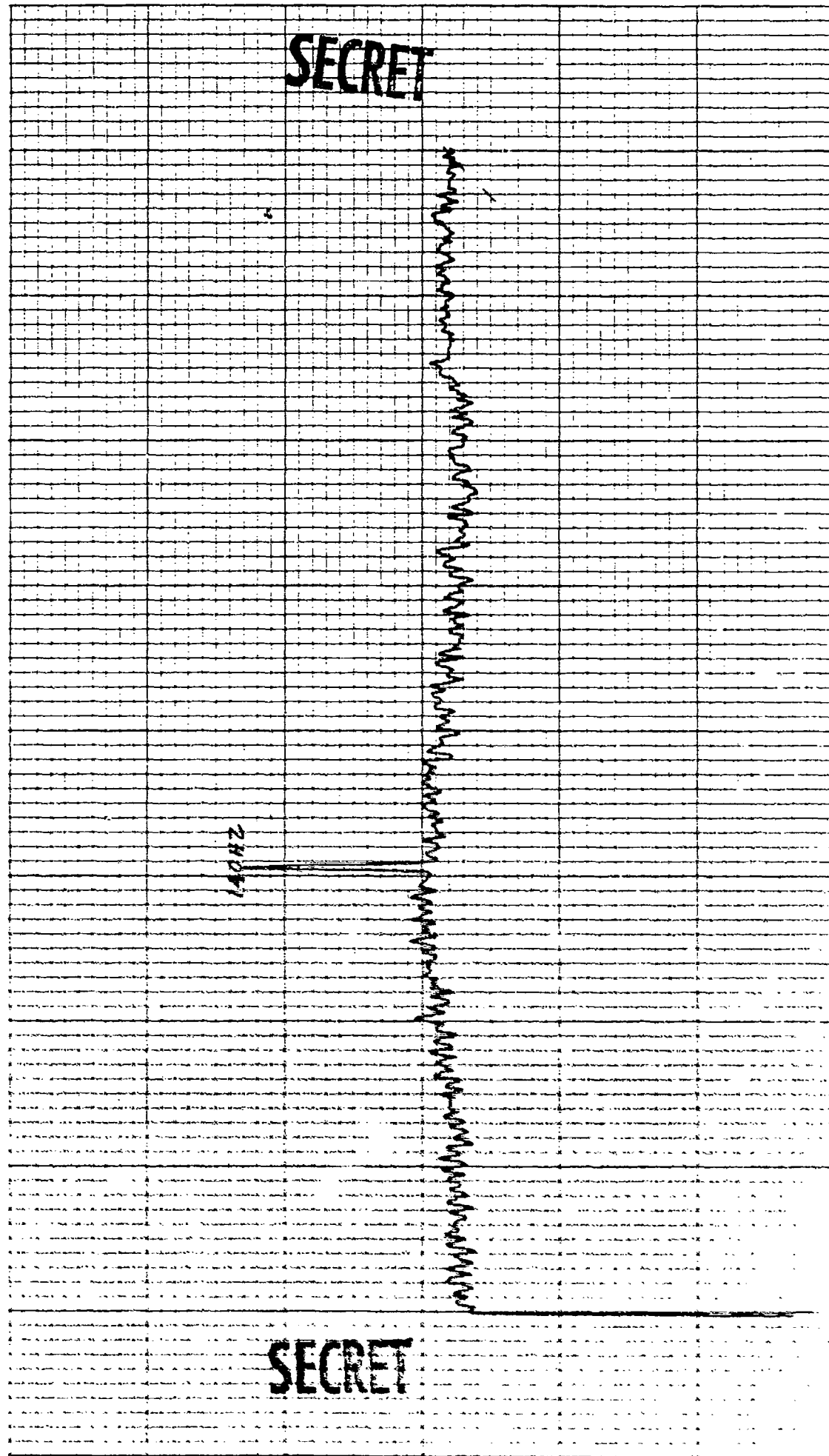
CONTROL: 3-16 - 140 (50)
OMNI SPECTRUM (ELEMENT 49)
EXERCISE: BEARING STAKE
CENTER FREQ: 150 HZ
1 ELEMENT

DATE OF ANALYSIS:

DATE/TIME: 3-16-77 - 1140 Z
ANALYSIS BANDWIDTH: 1/10 HZ
— DEG AZ STEERING

REEL: 124 INDEX 1980

INTEGRATION TIME 320 SECS
FILTER WTC: HANNING
ATTEN: - DB



KSE 10 X 10 TO THE INCH 7 X 10 INCHES
KREIFFEL & ESSER CO. MADE IN U.S.A.

46 0703

CONTROL: 3-16 - 1148 (51)
OMNI SPECTRUM (ELEMENT 51)
EXERCISE: BEARING STAKE
CENTER FREQ: 150 HZ
1 ELEMENT

DATE OF ANALYSIS:

DATE/TIME: 3-16-77 - 1148 Z

ANALYSIS BANDWIDTH: 1/10 HZ
— DEG AZ STEERING

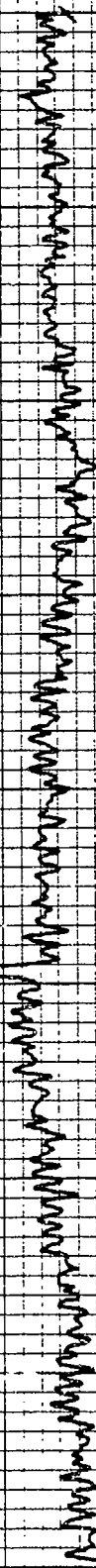
REEL: 1124 INDEX 1980

INTEGRATION TIME 320 SECS ATTN: — DB
FILTER WTC: HANNING

SECRET

SECRET

150 HZ



K&E 10 X 10 TO THE INCH • 7 X 10 INCHES
NEUFEL & ESSER CO. MADE IN U.S.A.

46 0703

CONTROL: 3-16-1148 (52)
OMNI SPECTRUM (ELEMENT 52)
EXERCISE: BEARING STAKE
CENTER FREQ: 150 HZ
1 ELEMENT

DATE OF ANALYSIS:

DATE/TIME: 3-16-77 - 1148 Z

ANALYSIS BANDWIDTH: 1/10 HZ
— DEG AZ STEERING

REEL: 424

INDEX 1980

INTEGRATION TIME 320 SECS
FILTER

ATTEN: - DB
WTG: HANNING

SECRET

SECRET

Handwritten notes and a large 'X' mark on the graph grid.

KSE 10 X 10 TO THE INCH • 7 X 10 INCHES
KEUFFEL & ESSER CO. MADE IN U.S.A.

46 0703

CONTROL: 3-16 - 1140 (1)
OMNI SPECTRUM (ELEMENT 2)
EXERCISE: BEARING STAKE
CENTER FREQ: 280 HZ
1 ELEMENT

DATE OF ANALYSIS:

DATE/TIME: 3-16-77 - 1140 Z

ANALYSIS BANDWIDTH: 1/10 HZ
DEG AZ STEERING

REEL: M24

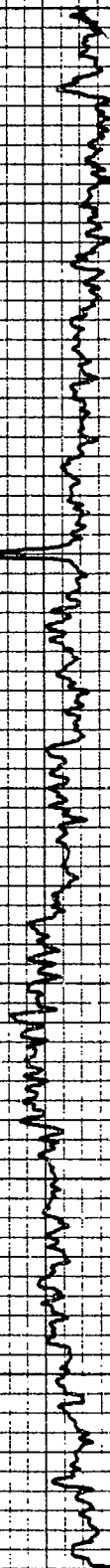
INDEX: 1980

INTEGRATION TIME 320 SECS
FILTER
ATTN: - DB
WTG: HANNING

SECRET

280 HZ

SECRET



K&E 10 X 10 TO THE INCH • 7 X 10 INCHES
NEUFEL & ESSER CO. MADE IN U.S.A.

46 0703

CONTROL: 3-16-1148 (2)
OMNI SPECTRUM (ELEMENT 4)
EXERCISE: BEARING STAKE
CENTER FREQ: 280 HZ
1 ELEMENT

DATE OF ANALYSIS:

DATE/TIME: 3-16-77 - 1148 Z
ANALYSIS BANDWIDTH: 1/10 HZ
— DEG AZ STEERING

REEL: 1724

INDEX: 1980

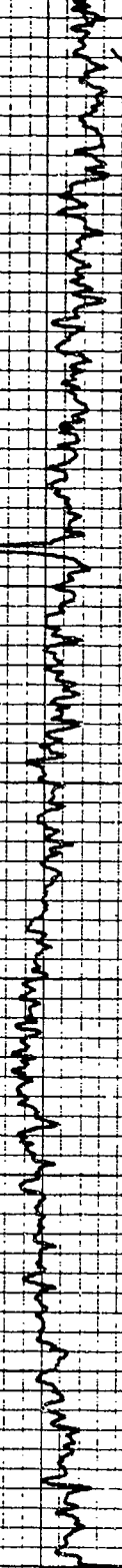
INTEGRATION TIME 320 SECS
FILTER WTC: HANNING

ATTEN: ~ DB

SECRET

SECRET

280 HZ



KE 10 X 10 TO THE INCH • 7 X 10 INCHES
KEUFFEL & ESSER CO. MADE IN U.S.A.

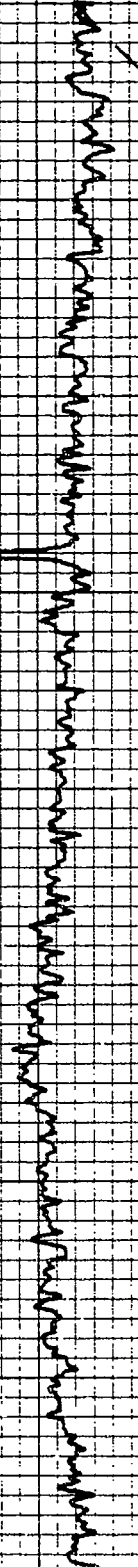
46 0703

CONTROL: 3-16-1148 (3) DATE OF ANALYSIS: REEL: 1124 INDEX: 980
OMNI SPECTRUM (ELEMENT 6)
EXERCISE: BEARING STAKE
CENTER FREQ: 280 HZ
1 ELEMENT
INTEGRATION TIME 320 SECS ATTN: DB
FILTER WTG: HANNING
ANALYSIS BANDWIDTH: 1/10 HZ
DEG AZ STEERING

SECRET

SECRET

280 HZ



10 X 10 TO THE INCH • 7 X 10 INCHES
KEUFFEL & ESSER CO. MADE IN U.S.A.

46 0703

CONTROL: 3-16-1148 (4)
OMNI SPECTRUM (ELEMENT 9)
EXERCISE: BEARING STAKE
CENTER FREQ: 280 HZ
1 ELEMENT

DATE OF ANALYSIS:

DATE/TIME: 3-16-77 - 1148 Z

ANALYSIS BANDWIDTH: 1/10 HZ
— DEG AZ STEERING

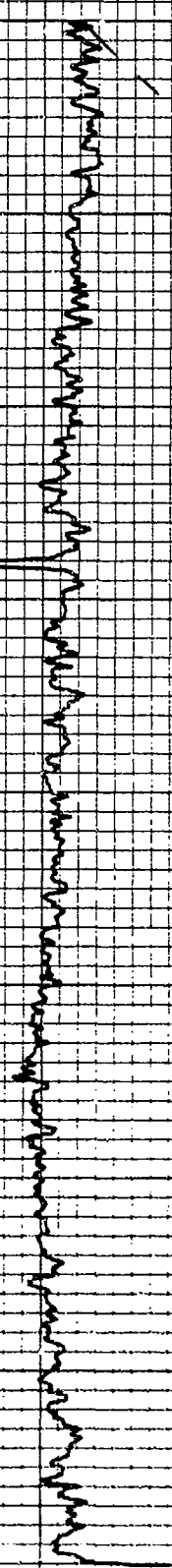
REEL: M34 INDEX: 1990

INTEGRATION TIME 320 SECS ATTN: — DB
FILTER WTG: HANNING

SECRET

SECRET

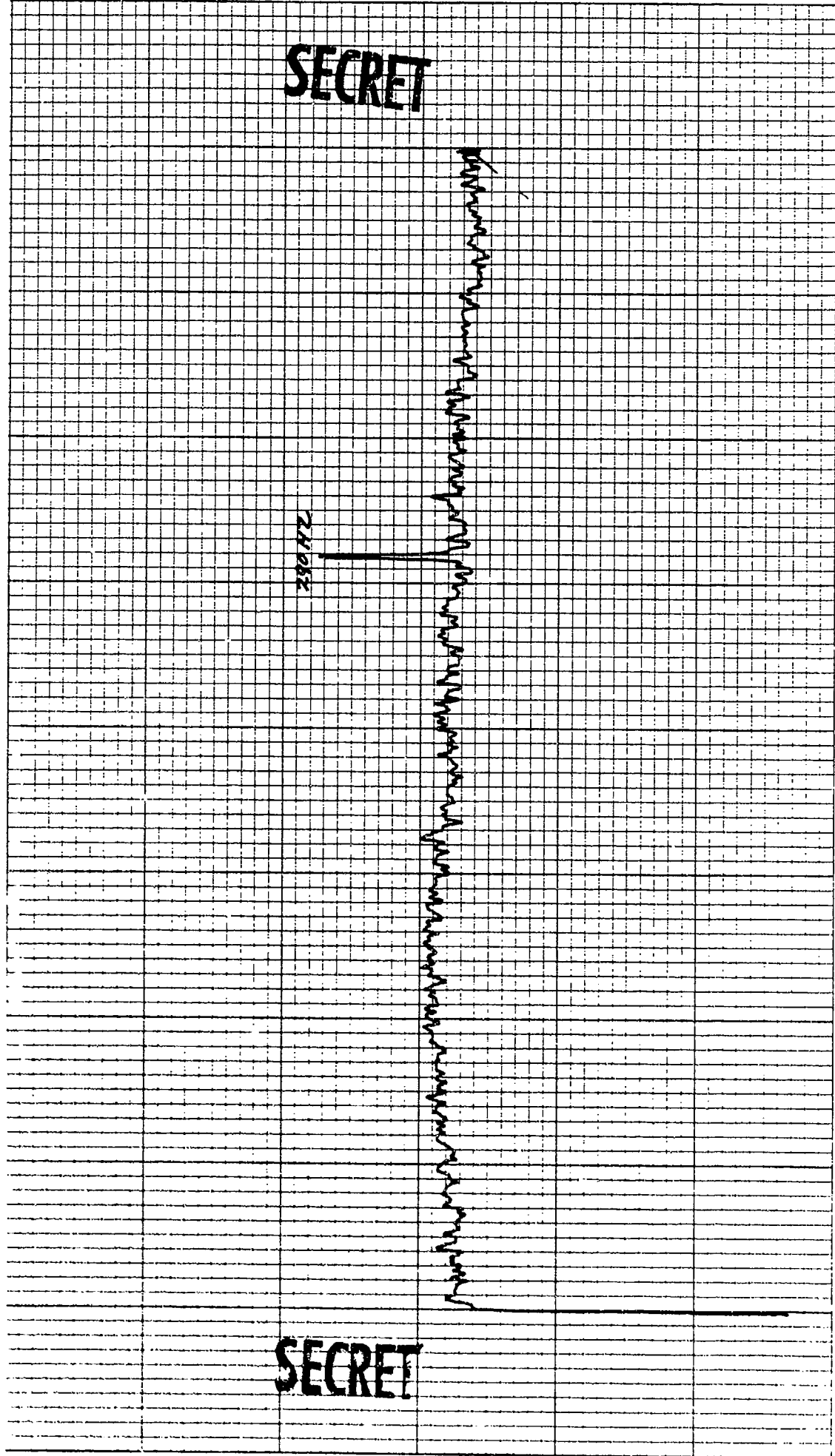
280 HZ



10 X 10 TO THE INCH • 7 X 10 INCHES
KRUHVEL APSSER CO. MADE IN U.S.A.

46 0703

CONTROL: 376-1148 (5) DATE OF ANALYSIS: REEL: M24 INDEX 1980
OMNI SPECTRUM (ELEMENT 10)
EXERCISE: BEARING STAKE
CENTER FREQ: 280 HZ
INTEGRATION TIME 320 SECS ATTN: DB
1 ELEMENT FILTER WTG: HANNING
DATE/TIME: 3-16-77 - 1148 Z
ANALYSIS BANDWIDTH: 1/10 HZ
— DEG AZ STEERING



K·E 10 X 10 TO THE INCH • 7 X 10 INCHES
KEUFFEL & ESSER CO. MADE IN U.S.A.

46 0703

CONTROL: 3-16-1148 (6)
OMNI SPECTRUM (ELEMENT 12)
EXERCISE: BEARING STAKE
CENTER FREQ: 280 HZ
1 ELEMENT

DATE OF ANALYSIS:

DATE/TIME: 3-16-77-1148 Z
ANALYSIS BANDWIDTH: 1/10 HZ
DEG AZ STEERING

REEL: M24 INDEX: 180

INTEGRATION TIME 320 SECS
FILTER
ATTN: - DB
WTG: HANNING

280 HZ

SECRET

SECRET

Amplitude of spectrum measured at 280 HZ. The spectrum shows a peak at 280 HZ, which is the center frequency of the exercise. The peak is at 280 HZ, and the spectrum is measured at 280 HZ.

K-2 10 X 10 TO THE INCH • 7 X 10 INCHES
KEUFFEL & ESSER CO. MADE IN U.S.A.

46 0703

CONTROL: 3-16 - 1148 (7)
OMNI SPECTRUM (ELEMENT 14)
EXERCISE: BEARING STAKE
CENTER FREQ: 280 HZ
1 ELEMENT

DATE OF ANALYSIS:

DATE/TIME: 3-16-77 - 1148 Z

ANALYSIS BANDWIDTH: 1/10 HZ
DEG AZ STEERING

REEL: M24

INDEX 1980

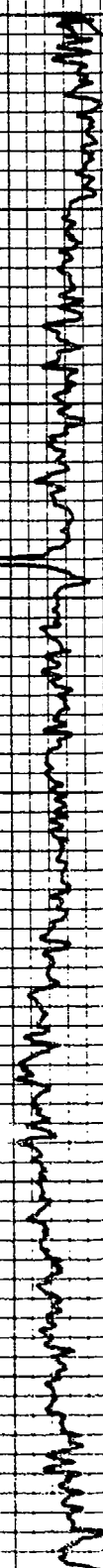
INTEGRATION TIME 320 SECS
FILTER

ATTEN: - DB
WTG: HANNING

SECRET

SECRET

280 HZ



10 X 10 TO THE INCHES : 3 10 INCHES
K&E NEUPHIL & SONS CO. MADE IN U.S.A.

46 0703

CONTROL: 3-14-1148 (6)
OMNI SPECTRUM (ELEMENT 16)
EXERCISE: BEARING STAKE
CENTER FRFQ: 290 HZ
1 ELEMENT

DATE OF ANALYSIS:

DATE/TIME: 3-16-77 - 1148 Z
ANALYSIS BANDWIDTH: 1/10 HZ
DEG AZ STEERING

REEL: 124

INDEX 198

INTEGRATION TIME 320 SECS
ATTEN: - DB
FILTER
WTG: HANNING

SECRET

SECRET

290 HZ



KSE 10 X 10 TO THE INCH • 7 X 10 INCHES
KEUFFEL & ESSLER CO. MADE IN U.S.A.

46 0703

CONTROL: 3-16-1140 (9)
OMNI SPECTRUM (ELEMENT 19)
EXERCISE: BEARING STAKE
CENTER FREQ: 280 HZ
1 ELEMENT

DATE OF ANALYSIS:

DATE/TIME: 3-16-77 - 1140 Z
ANALYSIS BANDWIDTH: 1/10 HZ
— DEG AZ STEERING

REEL: M22

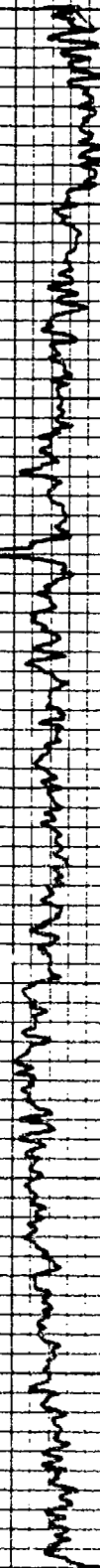
INDEX: 1910

INTEGRATION TIME 320 SECS
FILTER
ATTN: — DB
WTG: HANNING

SECRET

SECRET

290 HZ



CONTROL: 3-16 - 1148 (10)
 OMNI SPECTRUM (ELEMENT 20)
 EXERCISE: BEARING STAKE
 CENTER FREQ: 200 HZ
 1 ELEMENT

DATE OF ANALYSIS:

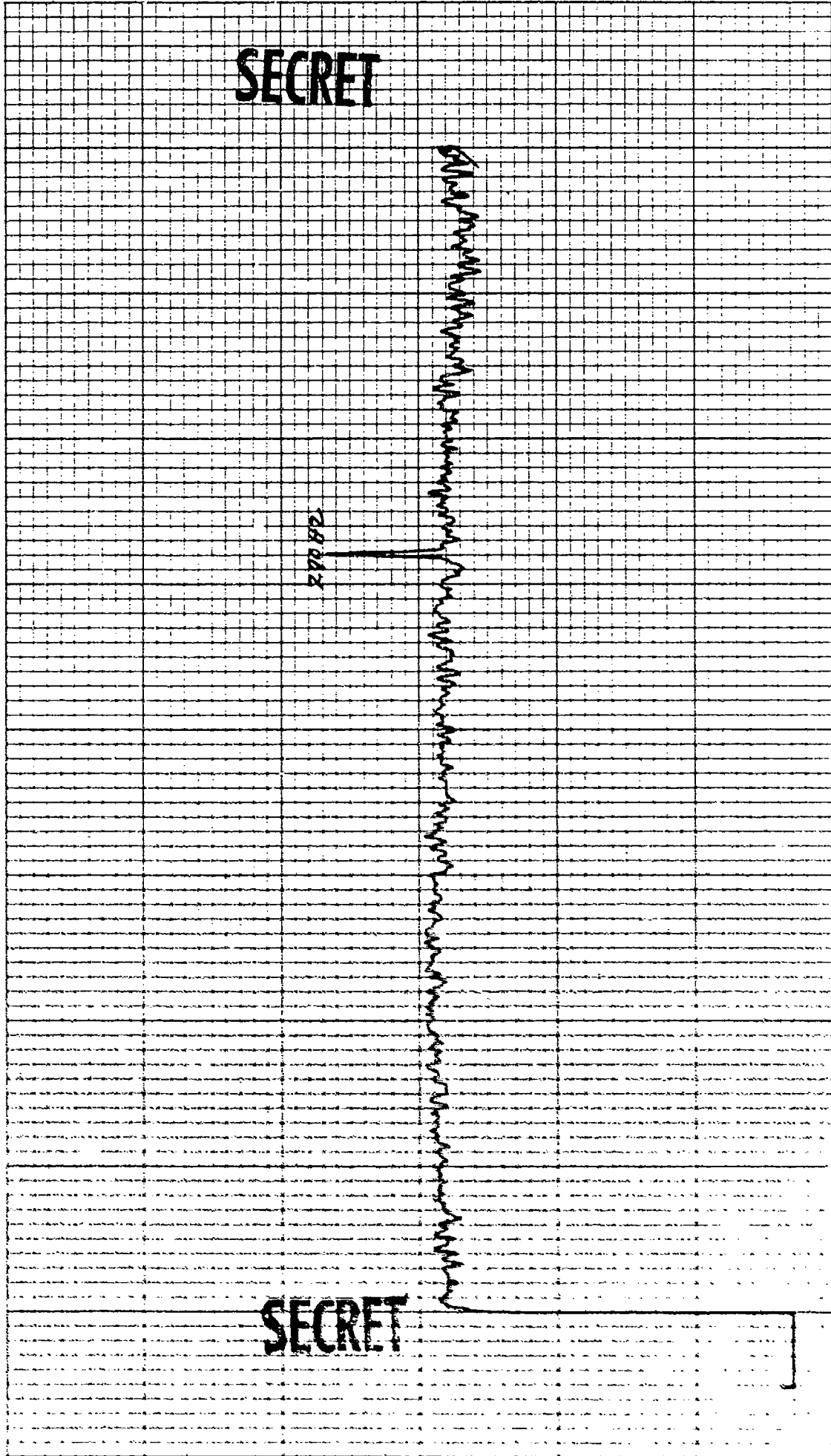
DATE/TIME: 3-16-77 - 1148 Z

ANALYSIS BANDWIDTH: 1/10 HZ
 — DEC AZ STEERING

REEL: M24

INDEX: 1900

INTEGRATION TIME 320 SECS
 FILTER
 ATTN: ~ DB
 WTG: HANNING



SECRET

SECRET

KOE 10 X 10 TO THE INCHES
NEUPILL & FISCH CO. MADE IN U.S.A.

46 0703

CONTROL: 3-16-1148 (11)
OMNI SPECTRUM (ELEMENT 23)
EXERCISE: BEARING STAKE
CENTER FREQ: 280 HZ
1 ELEMENT

DATE OF ANALYSIS:

DATE/TIME: 3-16-77 - 1148 Z
ANALYSIS BANDWIDTH: 1/10 HZ
— DEG AZ STEERING

REEL: M 24 INDEX: 1960

INTEGRATION TIME 320 SECS
FILTER
ATTN: — DB
WTG: HANNING

SECRET

21072

SECRET

[Handwritten scribbles and markings across the grid area]

10 X 10 TO THE INCH • 7 X 10 INCHES
NEUPPEL & CO. INC. • MADE IN U.S.A.

46 0703

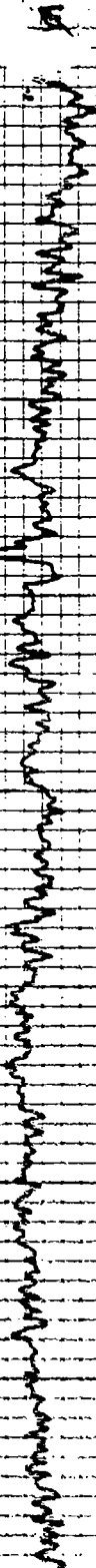
CONTROL: 3-16-1140 (12) DATE OF ANALYSIS: REEL: M24 INDEX: 1980
OMNI SPECTRUM (ELEMENT 24)
EXERCISE: BEARING STAKE
CENTER FREQ: 280 HZ INTEGRATION TIME 320 SECS ATTEN: - DB
1 ELEMENT - DEG AZ STEERING FILTER WTC: HANNING

DATE/TIME: 3-16-77 - 1140 Z
ANALYSIS BANDWIDTH: 1/10 HZ

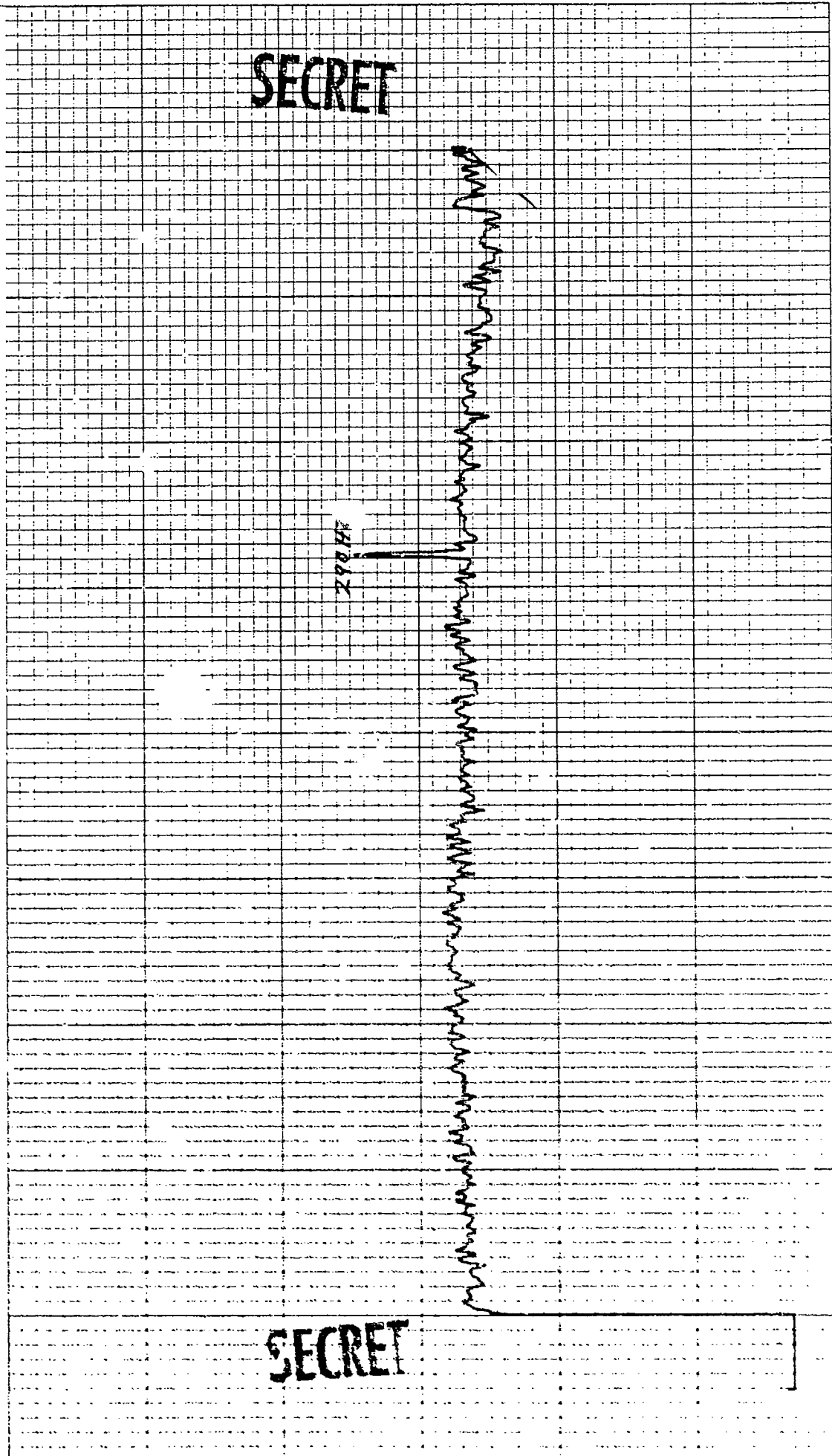
SECRET

SECRET

24002



CONTROL: 3-16-1140 (13) DATE OF ANALYSIS: REEL: M24 INDEX 1980
 OMNI SPECTRUM (ELEMENT 26)
 EXERCISE: BEARING STAKE
 CENTER FREQ: 200 HZ INTEGRATION TIME 300 SECS ATTN: DB
 1 ELEMENT FILTER WTG: HANNING
 DATE/TIME: 3-16-77 - 1140 L
 ANALYSIS BANDWIDTH: 1/10 HZ
 DEG AZ STEERING



10 X 10 TO THE INCH • 2 IN. ELEPHANTS
WEIGHT & FISSILE CO. MADE IN U.S.A.

46 0703

CONTROL: 3-16 - 1148 (14)
OMNI SPECTRUM (ELEMENT 29)
EXERCISE: BEARING STAKE
CENTER FREQ: 280 HZ
1 ELEMENT

DATE OF ANALYSIS:

DATE/TIME: 3-16-77 - 1148 Z
ANALYSIS BANDWIDTH: 1/10 HZ
DEG AZ STEERING

REEL: M24

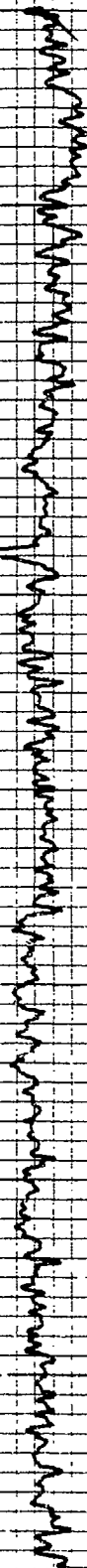
INDEX 1980

INTEGRATION TIME 320 SECS
FILTER WTG: HANNING
ATTN: - DB

SECRET

SECRET

290 HZ



19 X 10 TO THE INCH • 7 X 19 INCHES
KEUFEL & ESSER CO. MADE IN USA

46 0703

CONTROL: 3-16 - 1140 (15)
OMNI SPECTRUM (ELEMENT 31)
EXERCISE: BEARING STAKE
CENTER FREQ: 280 HZ
1 ELEMENT

DATE OF ANALYSIS:

DATE/TIME: 3-16-77 - 1140 Z

ANALYSIS BANDWIDTH: 1/10 HZ

— DEG AZ STEERING

REEL: M24

INDEX 1980

INTEGRATION TIME 320 SECS

FILTER

ATTN: — DB
WTG: HANNING

SECRET

280 HZ

SECRET

K&E 10 X 10 TO THE INCH • 7 X 10 INCHES
KEUFFEL & ESSER CO. MADE IN U.S.A.

46 0703

CONTROL: 3-16 - 1148 (16)
OMNI SPECTRUM (ELEMENT 33)
EXERCISE: BEARING STAKE
CENTER FREQ: 280 HZ
1 ELEMENT

DATE OF ANALYSIS:

DATE/TIME: 3-16-77 - 1148 Z
ANALYSIS BANDWIDTH: 1/10 HZ
— DEG AZ STEERING

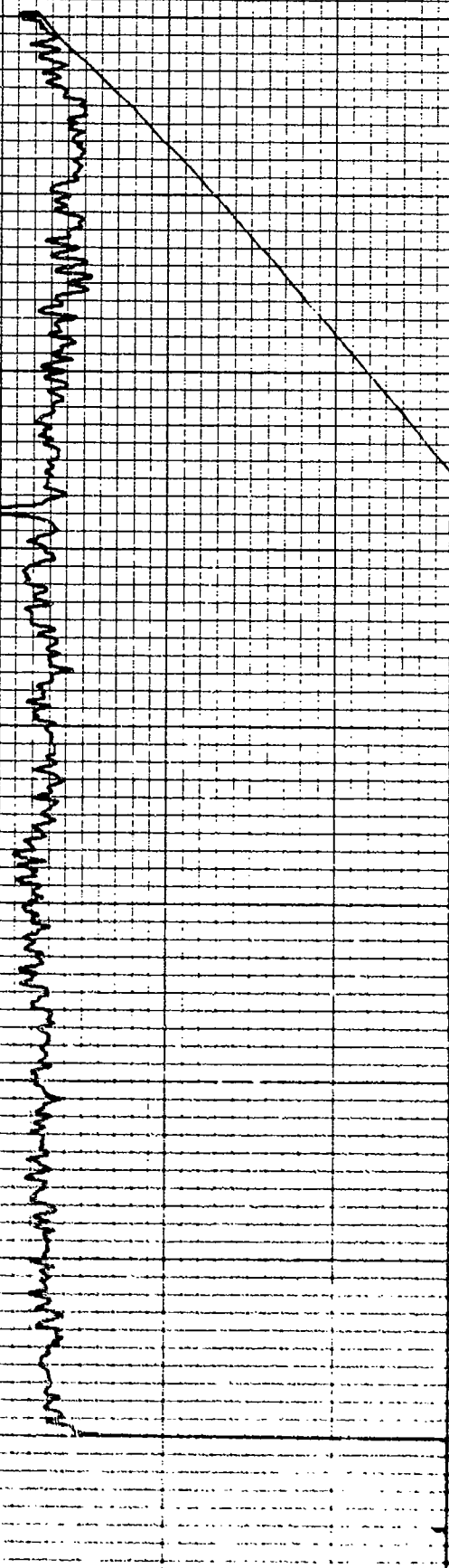
REEL: M24 INDEX: 1980

INTEGRATION TIME 320 SECS
ATTEN: - DB
FILTER WTG: HANNING

SECRET

SECRET

280 HZ



KSE 10 X 10 TO THE INCH • 7 X 10 INCHES
NEUF & ESSER CO. MADE IN U.S.A.

46 0703

CONTROL: 3-16 - 1148 (17)
OMNI SPECTRUM (ELEMENT 35)
EXERCISE: BEARING STAKE
CENTER FREQ: 200 HZ
1 ELEMENT

DATE OF ANALYSIS:

DATE/TIME: 3-16-77 - 1148 Z
ANALYSIS BANDWIDTH: 1/10 HZ
— DEG AZ STEERING

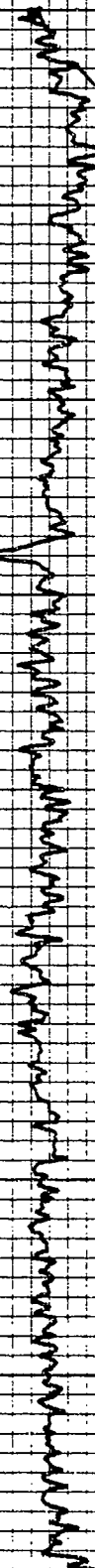
REEL: H24 INDEX 198c

INTEGRATION TIME 320 SECS ATTN: DB
FILTER WTG: HANNING

SECRET

SECRET

200 HZ



K&E 10 X 10 TO THE INCH • 7 X 10 INCHES
KEUFFEL & ESSER CO. MADE IN U.S.A.

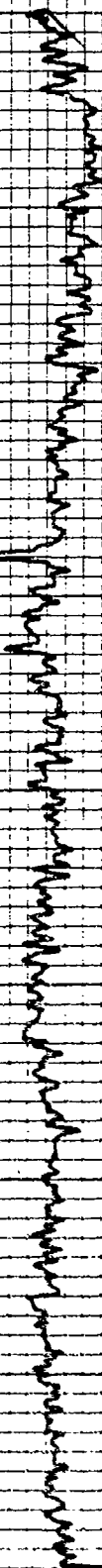
46 0703

CONTROL: 346-1148 (18) DATE OF ANALYSIS: REEL: 424 INDEX 1980
OMNI SPECTRUM (ELEMENT 37)
EXERCISE: BEARING STAKE
CENTER FREQ: 280 HZ
1 ELEMENT
INTEGRATION TIME 320 SECS ATTN: - DB
FILTER WTC: HANNING
DATE/TIME: 346-77-1148 Z
ANALYSIS BANDWIDTH: 1/10HZ
— DEG AZ STEERING

SECRET

SECRET

280 HZ



46 0703

INDEX 1980

REEL: 1724

DATE OF ANALYSIS:

EXERCISE: BEARING STAKE

DATE/TIME: 3-6-77 - 1148 Z

CENTER FREQ: 280 HZ

ANALYSIS BANDWIDTH: 1/10HZ

INTEGRATION TIME 320 SECS ATTN: - DB
 FILTER WTC: HANNING

1 ELEMENT

DEG AZ STEERING

FILTER WTG: HANNING

SECRET

SECRET

2005

1. What is the purpose of the study?

46 0703

CONTROL: 3-16 - 1148 (20)
OMNI SPECTRUM (ELEMENT 41)
EXERCISE: BEARING STAKE
CENTER FREQ: 280 HZ
1 ELEMENT

DATE OF ANALYSIS:

DATE/TIME: 3-16-77 - 1148 Z
ANALYSIS BANDWIDTH: 1/10 HZ
— DEG AZ STEERING

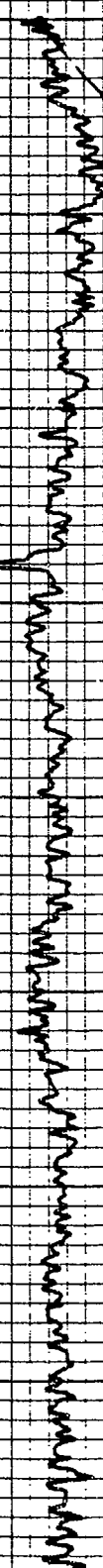
REEL: M24 INDEX: 1960

INTEGRATION TIME 320 SECS
FILTER
ATTEN: — DB
WTG: HANNING

SECRET

SECRET

280 HZ



K-2 10 X 10 TO THE INCH • 7 X 10 INCHES
KEUFFEL & ESSER CO. MADE IN U.S.A.

46 0703

CONTROL: 3-16 - 1148 (21)
OMNI SPECTRUM (ELEMENT 43)
EXERCISE: BEARING STAKE
CENTER FREQ: 280 HZ
1 ELEMENT

DATE OF ANALYSIS:

DATE/TIME: 3-16-77 - 1148 Z
ANALYSIS BANDWIDTH: 1/10 HZ
— DEG AZ STEERING

REEL: M24 INDEX 1980

INTEGRATION TIME 320 SECS
FILTER
ATTEN: — DB
WTG: HANNING

SECRET

SECRET

280 HZ

[Handwritten signature/initials across the grid]

46 0703

DATE OF ANALYSIS:

DATE/TIME: 3-16-77 - 1140 Z
ANALYSIS BANDWIDTH: 1/10HZ
— DEC AZ STEERING

REEL: M24
INDEX: 1980

INTEGRATION TIME 320 SECS ATTN: - DB
 FILTER WTC: HANNING

SECRET

SECRET

2682

*I have been thinking about you
and how much I love you.
I hope you are happy and healthy.*

10 X 10 TO THE INCHES
KEUFEL & ESSER CO. MADE IN U.S.A.

46 0703

CONTROL: 3-16 -1/40 (22)
OMNI SPECTRUM (ELEMENT 45)
EXERCISE: BEARING STAKE
CENTER FREQ: 280 HZ
1 ELEMENT

DATE OF ANALYSIS:

DATE/TIME: 3-16-77 -1/40 Z
ANALYSIS BANDWIDTH: 1/10 HZ
— DEG AZ STEERING

REEL: M24 INDEX 1980

INTEGRATION TIME 320 SECS
ATTEN: - DB
FILTER WTG: HANNING

SECRET

SECRET

280 HZ

[Handwritten scribbles and markings across the grid]

14-00000 10 X 10 TO THE INCHES X 10 INCHES
HEUFFEL & FESSER CO. MADE IN U.S.A.

46 0703

CONTROL: 375 - 1140 (23)
OMNI SPECTRUM (ELEMENT 47)
EXERCISE: BEARING STAKE
CENTER FREQ: 200 HZ
1 ELEMENT

DATE OF ANALYSIS:

DATE/TIME: 7-11-77 - 1140 Z
ANALYSIS BANDWIDTH: 1/10 HZ
— DEG AZ STEERING

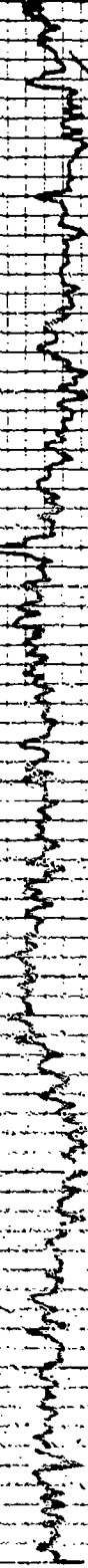
REEL: 424 INDEX: 180

INTEGRATION TIME 320 SECS
FILTER ATTN: - DB
WTG: HANNING

SECRET

SECRET

7-11-77



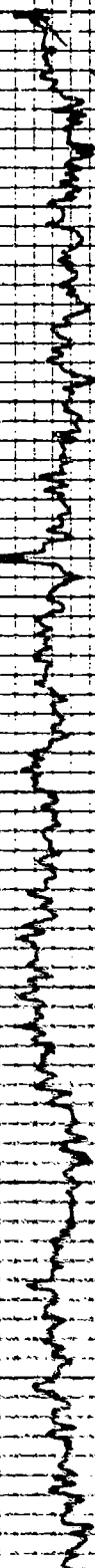
46 0703

DATE OF ANALYSIS: _____
DATE/TIME: 376-77 - 1140 Z
ANALYSIS BANDWIDTH: 1/10HZ
_____ DEG AZ STEERING
INTEGRATION TIME 320 SECS
ATTEN: - DB
WTC: HANNING
FILTER
REEL: 1124
INDEX/1980

SECRET

SECRET

八二五



12-10-77 1400 HRS. 2 30 PM-1000
RECEIVED 12-10-77 1400 HRS.

46 0703

CONTROL: 346-140 (25)
OMNI SPECTRUM (ELEMENT 51)
EXERCISE: BEARING STAKE
CENTER FREQ: 280 HZ
1 ELEMENT

DATE OF ANALYSIS:

DATE/TIME: 3-6-77 - 1402

ANALYSIS BANDWIDTH: 1/10 HZ
— DEC A2 STEERING

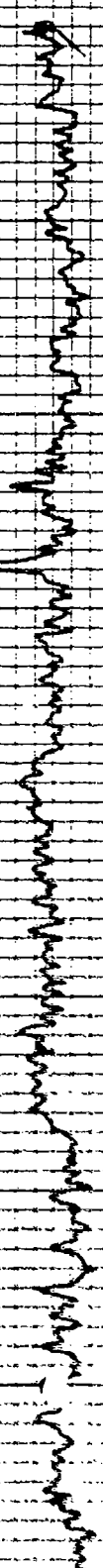
REEL: N24 INDEX 1980

INTEGRATION TIME 320 SECS ATTN: - DB
FILTER WTC: HANNING

SECRET

SECRET

280 HZ



INDEX 1980

REEL: 424

DATE OF ANALYSIS:

CONTROL: 3-16-1148 (26)
OMNI SPECTRUM (ELEMENT 53)

EXERCISE: BEARING STAKE

CENTER FREQ: 280 HZ

1 ELEMENT

DATE/TIME: 3-16-77 - 1148 Z
ANALYSIS BANDWIDTH: 1/10 HZ
DEG AZ STEERING

INTEGRATION TIME 320 SECS
FILTER

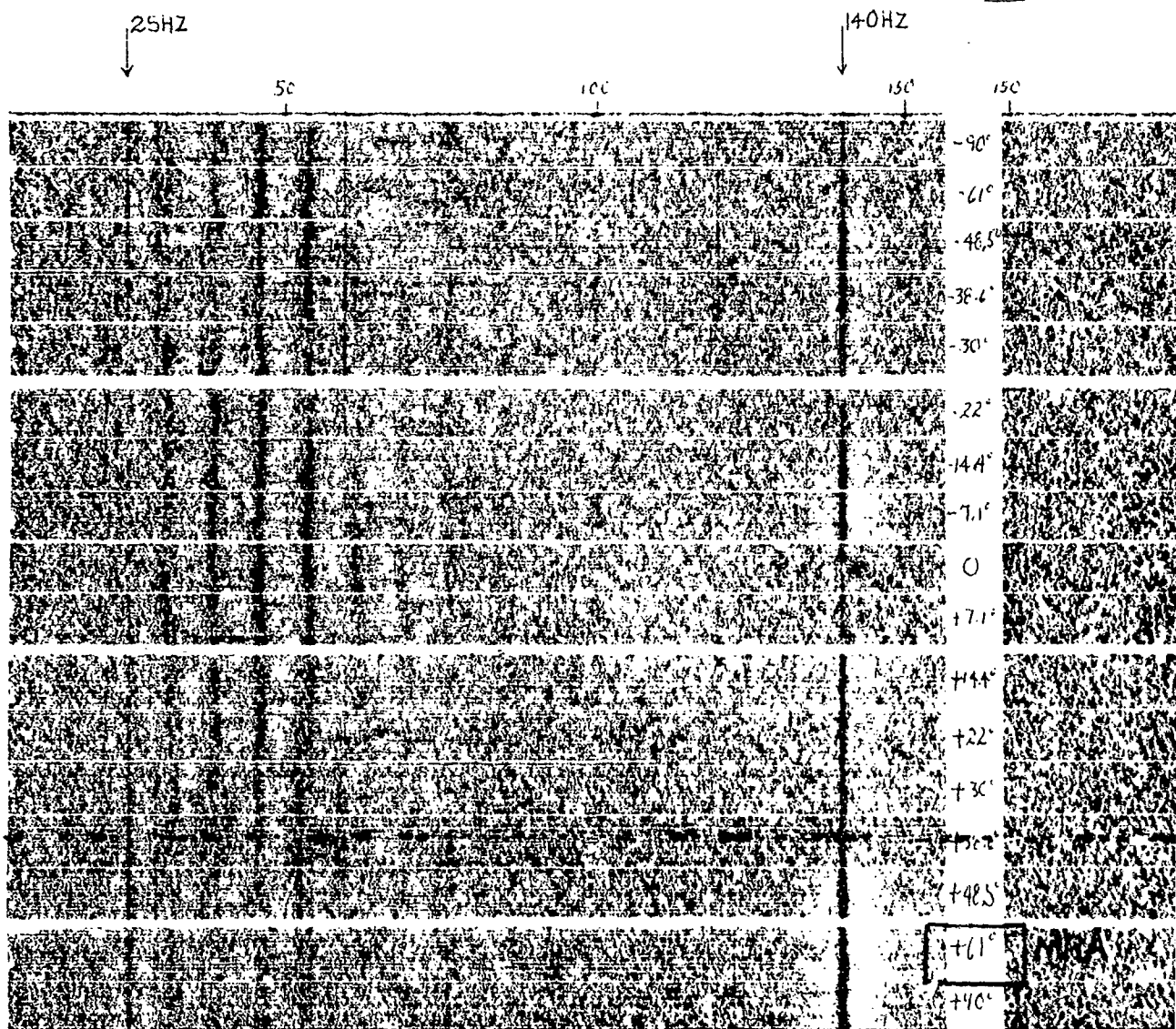
ATTN: DB
WTG: HANNING

SECRET

SECRET

285 HZ

Handwritten notes and a large 'X' mark on the grid.



CONTROL NUMBER 1148Z-51-DP12
 NUMBER OF ELEMENTS 16
 FREQUENCY BAND 10 TO 300 HZ
 RANGE 122 N.M.

HISTOGRAM
 TAPE REEL NUMBER M24
 ANALYSIS BAND WIDTH .2
 WATER DEPTH 2800 F

SECRET

290HZ
295H
300

2

140HZ

150

150

200

250

300



CONFIDENTIAL

SIGNAL LEVEL AND SNR

CALCULATIONS

DATA POINT 12

FREQUENCY 140 HZ

NUMBER OF ELEMENTS 16

SIGNAL LEVEL

MCPS-32 SIGNAL LEVEL INDICATED -22.7 dBV

MCPS-32 CAL. CORRECTION +10 -12.7

BEAMFORMER GAIN +18 +5.3 SIG. LEVEL FOR SNR CALCULATION

MRA CORRECTION + .18 +5.5 SIG. LEVEL FOR SIGNAL GAIN

NOISE LEVEL

MCPS-32 SIGNAL LEVEL INDICATED -54.6 dBV

MCPS-32 CAL. CORRECTION +10 -44.6

BEAMFORMER GAIN +18 -26.6 NOISE LEVEL FOR SNR CALCULATION

SIGNAL-NOISE-RATIO

SIGNAL LEVEL FOR SNR +5.3

NOISE LEVEL FOR SNR -26.6 31.9

PROCESSOR CORRECTION - 4.0 27.9

MRA CORRECTION + .2 28.1 SNR 1 HZ BAND

BANDWIDTH CONVERSION _____ SNR 1 HZ BAND

CONFIDENTIAL

CONFIDENTIAL

SIGNAL LEVEL AND SNR

CALCULATIONS

DATA POINT 12

FREQUENCY 290 HZ

NUMBER OF ELEMENTS 16

SIGNAL LEVEL

MCPS-32 SIGNAL LEVEL INDICATED -39.9 dBV
MCPS-32 CAL. CORRECTION +10 -29.9
BEAMFORMER GAIN +18 -11.9 SIG. LEVEL FOR SNR CALCULATION
MRA CORRECTION + .8 -11.1 SIG. LEVEL FOR SIGNAL GAIN

NOISE LEVEL

MCPS-32 SIGNAL LEVEL INDICATED -57.8 dBV
MCPS-32 CAL. CORRECTION +10 -47.8
BEAMFORMER GAIN +18 -29.8 NOISE LEVEL FOR SNR CALCULATION

SIGNAL-NOISE-RATIO

SIGNAL LEVEL FOR SNR -11.9
NOISE LEVEL FOR SNR -29.9 18.0
PROCESSOR CORRECTION -4.2 13.8
MRA CORRECTION + .8 14.6 SNR .013 HZ BAND
BANDWIDTH CONVERSION _____ SNR 1 HZ BAND

CONFIDENTIAL

CONFIDENTIAL

DATA POINT 12

SIGNAL GAIN

	<u>140 HZ</u>	<u>290HZ</u>	<u>295HZ</u>
MEAN OMNI SIGNAL LEVEL	<u>-24.8</u>	<u>-38.6</u>	<u> </u>
MRA SIGNAL LEVEL	<u>+5.5</u>	<u>-11.1</u>	<u> </u>
ARRAY SIGNAL GAIN	<u>30.3</u>	<u>27.5</u>	<u> </u>
20 LOG <u>16</u>	<u>24</u>	<u>24</u>	<u> </u>
# of elements			
DIFFERENCE	<u>+6.3</u>	<u>+3.5</u>	<u> </u>

ARRAY GAIN

MRA SNR	<u>28.1</u>	<u>14.6</u>	<u> </u>
MEAN OMNI SNR	<u>19.4</u>	<u>7.9</u>	<u> </u>
ARRAY GAIN	<u>8.7</u>	<u>6.7</u>	<u> </u>
THEORETICAL AZMUTH GAIN (at MRA)	<u>7.4</u>	<u>9.8</u>	<u> </u>
DIFFERENCE	<u>+ .7</u>	<u>- 3.1</u>	<u> </u>

CONFIDENTIAL

10 X 10 TO THE INCHES
NEUTRAL & 6000 CO. MADE IN U.S.A.

46 0703

CONTROL: 1/48 - 16 (DPA)
BEAMFORMED SPECTRUM (ELEMENTS)
EXERCISE: BEARING STAKE
CENTER FREQ: 140 HZ
16 ELEMENTS

DATE OF ANALYSIS: 1-16

REEL: 434

INTEGRATION TIME 320 SECS

INDE X 1995

ATTEN: -10 DB

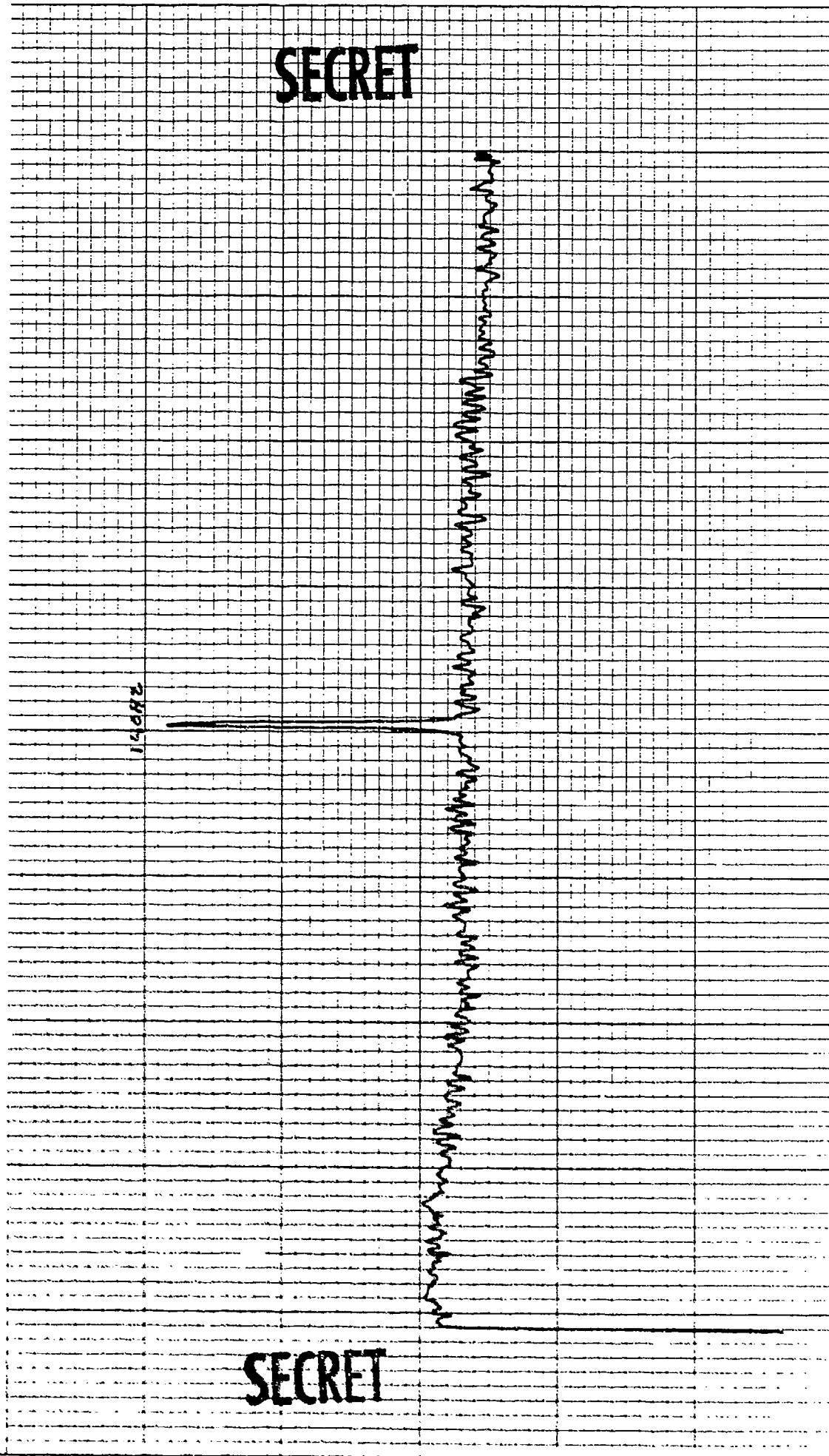
FILTER

WTG: HANNING

DAT / TIME: 3-16-77 - 1/48 Z

ANALYSIS BANDWIDTH: 1/10 HZ

+ 40 DEG. AZ STEERING



K₂ 10 X 10 TO THE INCH • 7 X 10 INCHES
NEUFEL & ESSER CO. MADE IN U.S.A.

46 0703

CONTROL: 1148 - 16 (D₂2)

BEAMFORMED SPECTRUM (ELEMENTS)

EXERCISE: BEARING STAKE

CENTER FREQ: 140 HZ

16 ELEMENTS

DATE OF ANALYSIS: 1-16

DATE/TIME: 3-76-77 - 1148 Z

ANALYSIS BANDWIDTH: 1/10 HZ

+ 50 DEG. AZ STEERING

REEL: 1124

INDE X1995

INTEGRATION TIME 320 SECS

ATTEN: -18 DB

FILTER WTG: HANNING

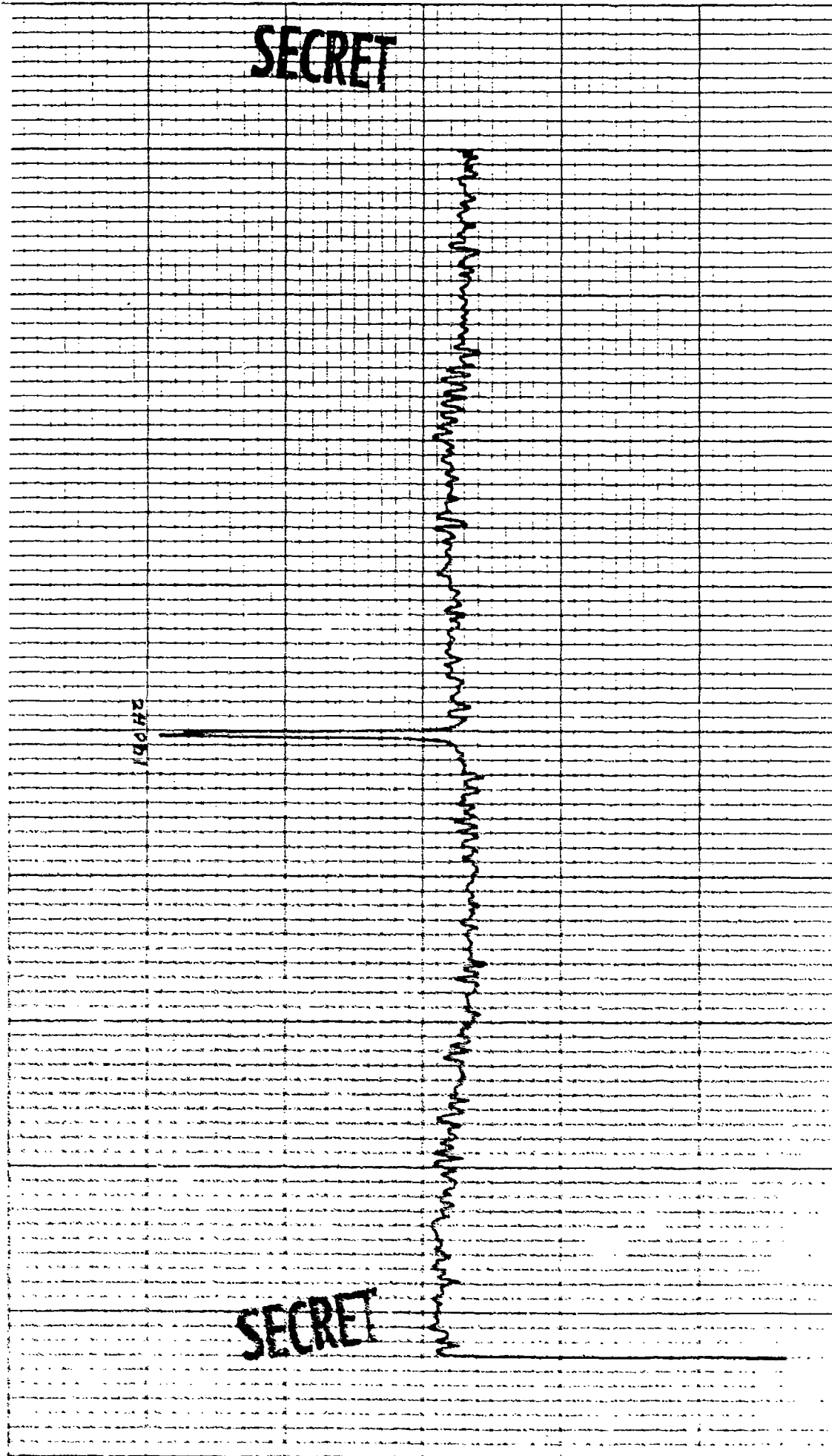
SECRET

SECRET

CONTROL: 1149 - 16 (QPIe.)
 BEAMFORMED SPECTRUM(ELEMENTS)
 EXERCISE: BEARING STAKE
 CENTER FREQ: 140 HZ
 11 ELEMENTS

DATE OF ANALYSIS: 1-16
 DATE/TIME: 3-16-77 - 1146 Z
 ANALYSIS BANDWIDTH: 1710HZ
 +52 DEG. AZ STEERING

REEL: 1124 INDE X/1125
 INTEGRATION TIME 320 SECS
 FILTER WTC: HANNING
 ATTN: -10 DB



KOE 10 X 10 TO THE INCHES
REMYEL & SSSER CO. MADE IN U.S.A.

46 0703

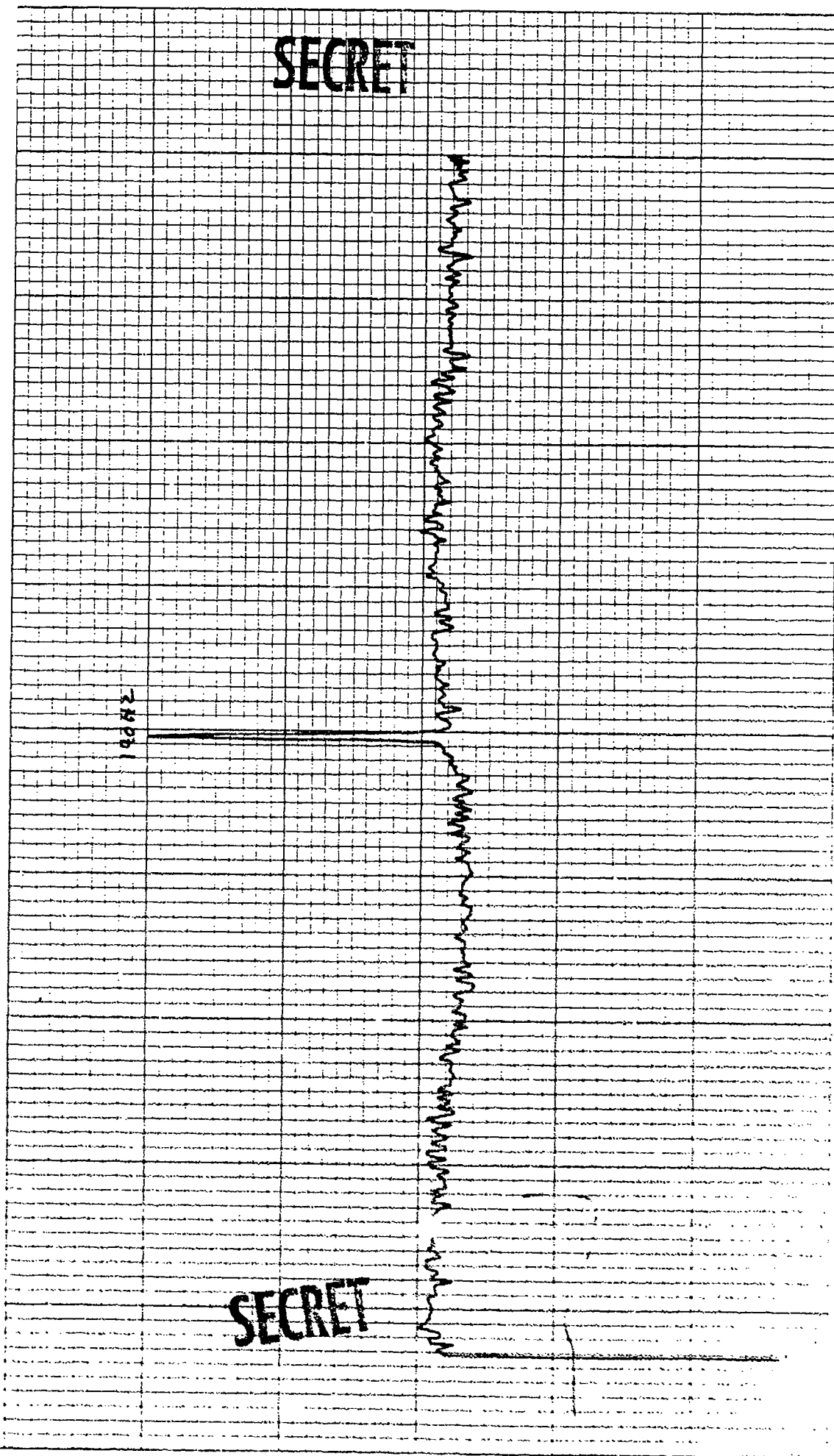
616.5

CONTROL: 1148 - 16 (DP12)
BEAMFORMED SPECTRUM (ELEMENTS)
EXERCISE: BEARING STAKE
CENTER FREQ: 140 HZ
16 ELEMENTS

DATE OF ANALYSIS: 1-16
DATE/TIME: 3-16-77 - 1148 Z
ANALYSIS BANDWIDTH: 1710 HZ
+54 DEG. AZ STEERING

REEL: 1134
INTEGRATION TIME 320 SECS
FILTER
WTG: HANNING

INDE X/1985



SECRET

SECRET

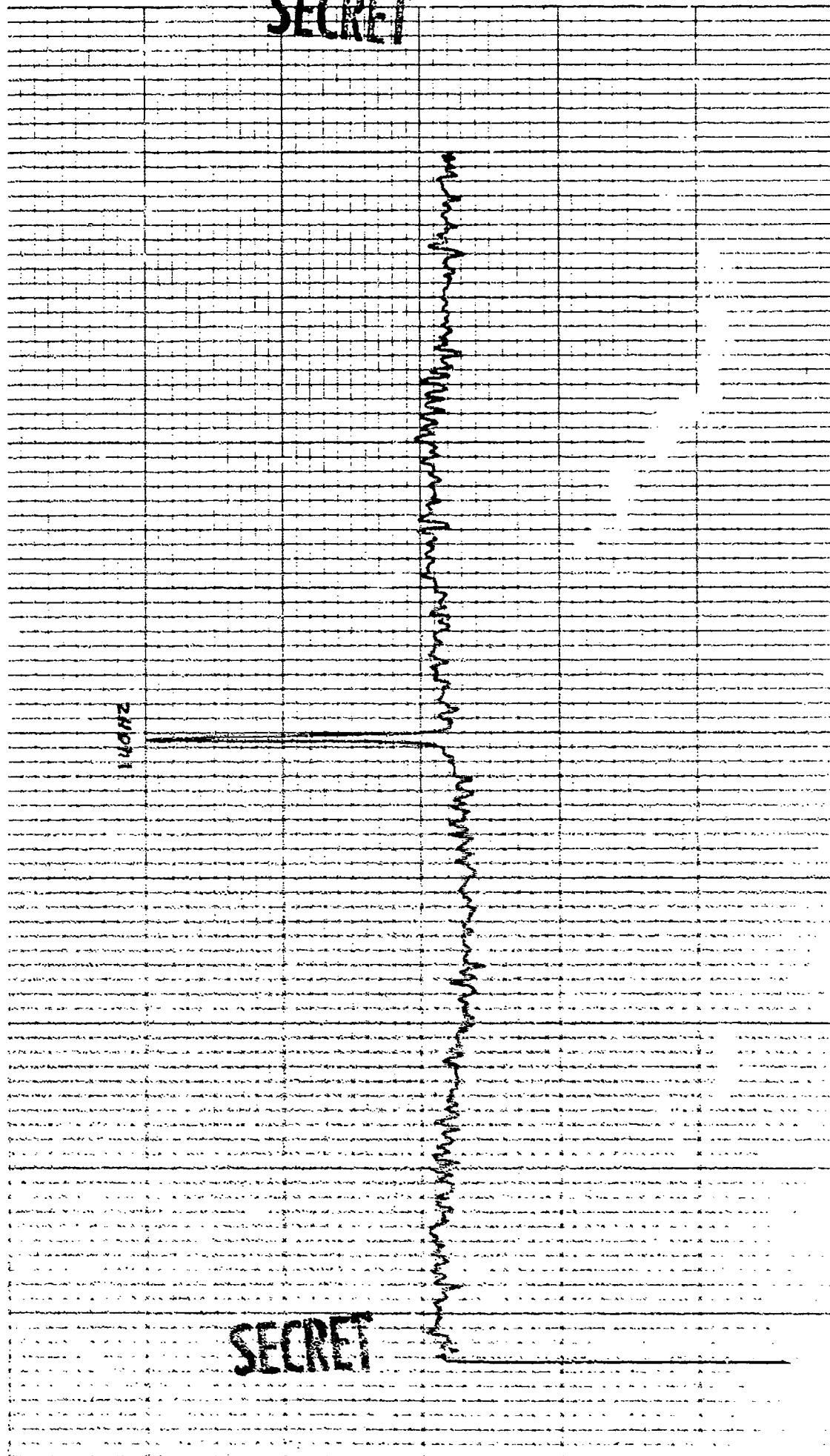
NO 10 TO THE INCHES 10 INCHES

46 0703

CONTROL: 1140 - 16 (20/12)
BEAMFORMED SPECTRUM(ELEMENTS
EXERCISE: BEARING STAKE
CENTER FREQ: 140 HZ
16 ELEMENTS

DATE OF ANALYSIS: - - - -
1-16
DATE/TIME: 3-16-77 - 1140 Z
ANALYSIS BANDWIDTH: 1/10HZ
+56 DEG. AZ STEERING

REEL: 1124 INDEX: 1124
INTEGRATION TIME 320 SECS
ATTEN: -18 DB
FILTER WTC: HANNING

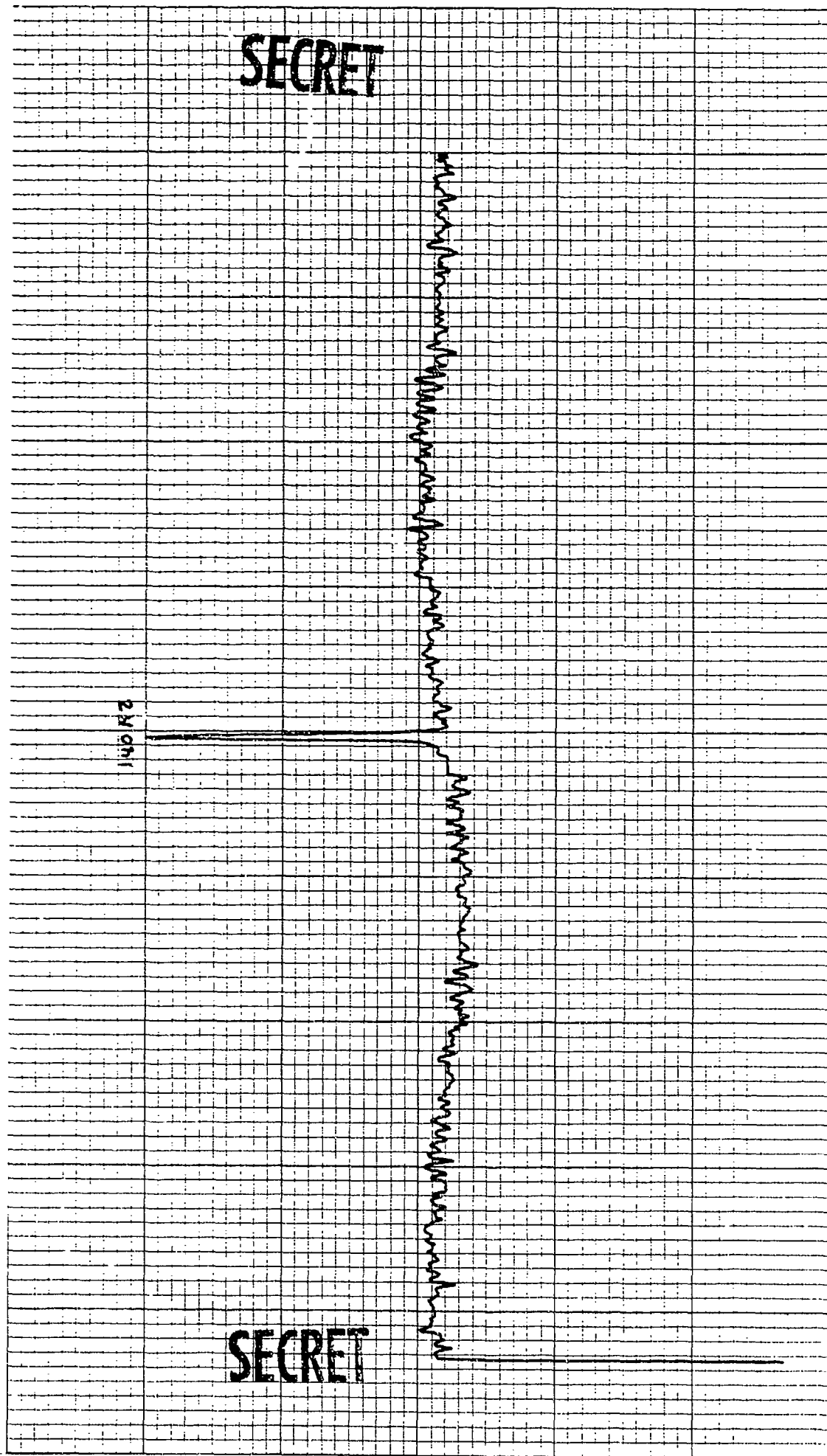


SECRET

CONTROL: 1140 - 16 (0712)
BEAMFORMED SPECTRUM(ELEMENTS)
EXERCISE: BEARING STAKE
CENTER FREQ: 140 HZ
16 ELEMENTS

DATE OF ANALYSIS: 1-16
DATE/TIME: 3-15-77 - 1148 Z
ANALYSIS BANDWIDTH: 1/10HZ
+58 DEG. AZ STEERING

REEL: M24
INTEGRATION TIME 320 SECS
FILTER WTG: HANNING
INDE X1995
ATTEN: -18 DB



K&E 10 X 10 TO THE INCH 7 X 10 INCHES
KEUFFEL & ESSER CO. MADE IN U.S.A.

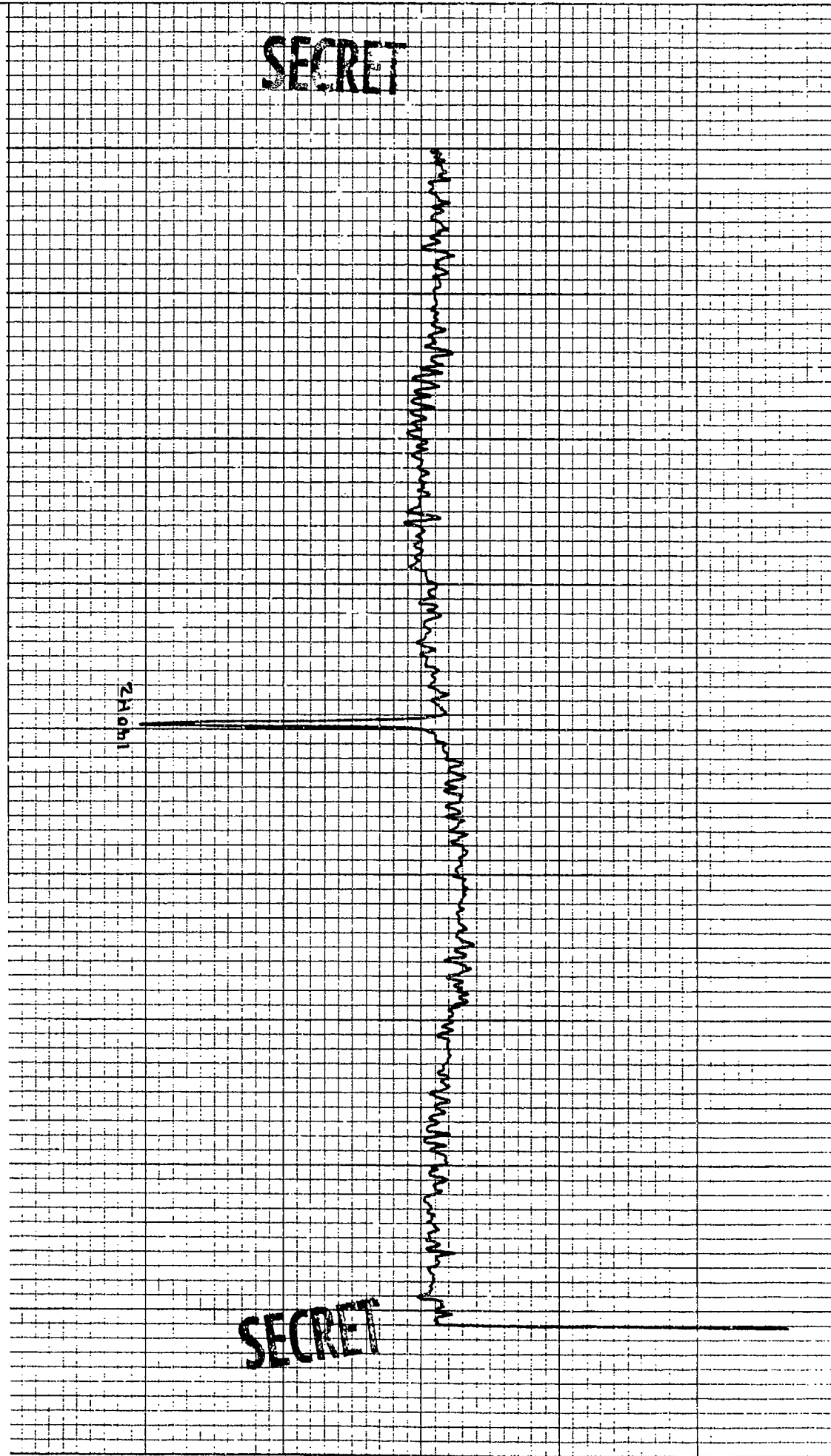
46 0703

7/11/73

CONTROL: 1140 - 16 (DP11)
BEAMFORMED SPECTRUM (ELEMENTS)
EXERCISE: BEARING STAKE
CENTER FREQ: 140 HZ
16 ELEMENTS

DATE OF ANALYSIS: 1-16
DATE/TIME: 3-16-77 - 1140
ANALYSIS BANDWIDTH: 1/10 HZ
+ 59 DEG. AZ STEERING

REEL: M24
INTEGRATION TIME 320 SECS
FILTER WTG: HANNING
INDE X1005



K-E 10 X 10 TO THE INCH • 7 X 10 INCHES
KEUFFEL & ESSER CO. MADE IN U.S.A.

46 0703

715/11

CONTROL: 1140 - 16 (DP12) DATE OF ANALYSIS: 1-16 REEL: 1424 INDE X/995
BEAMFORMED SPECTRUM (ELEMENTS))
EXERCISE: BEARING STAKE DATE/TIME: 3-16-77 - 1148 Z INTEGRATION TIME 320 SECS ATTN: -10 DB
CENTER FREQ: 140 HZ ANALYSIS BANDWIDTH: 1/10 HZ FILTER WTG: HANNING
16 ELEMENTS 400 DEG. AZ STEERING

140 HZ

SECRET

SECRET



46 0703

CONTROL: 1140 - 16 (D92)
BEAMFORMED SPECTRUM (ELEMENTS
EXERCISE: BEARING STAKE
CENTER FREQ: 140 HZ
16 ELEMENTS

DATE OF ANALYSIS: 1-16)
DATE/TIME: 3-16-77 - 1400Z
ANALYSIS BANDWIDTH: 1/16HZ
+61 DEG. AZ STEERING

REEL: M34 INDEX: X1985
INTEGRATION TIME 320 SECS ATTN: 70 DB
FILTER WTC: HANNING

INDE X 1995

SECRET

SECRET



The present position in the study of the history of the
 world is that the world is a single entity, and that the
 history of the world is the history of the world.

K*E 10 X 10 TO THE INCH • 7 X 10 INCHES
KEUFFEL & ESSER CO. MADE IN U.S.A.

46 0703

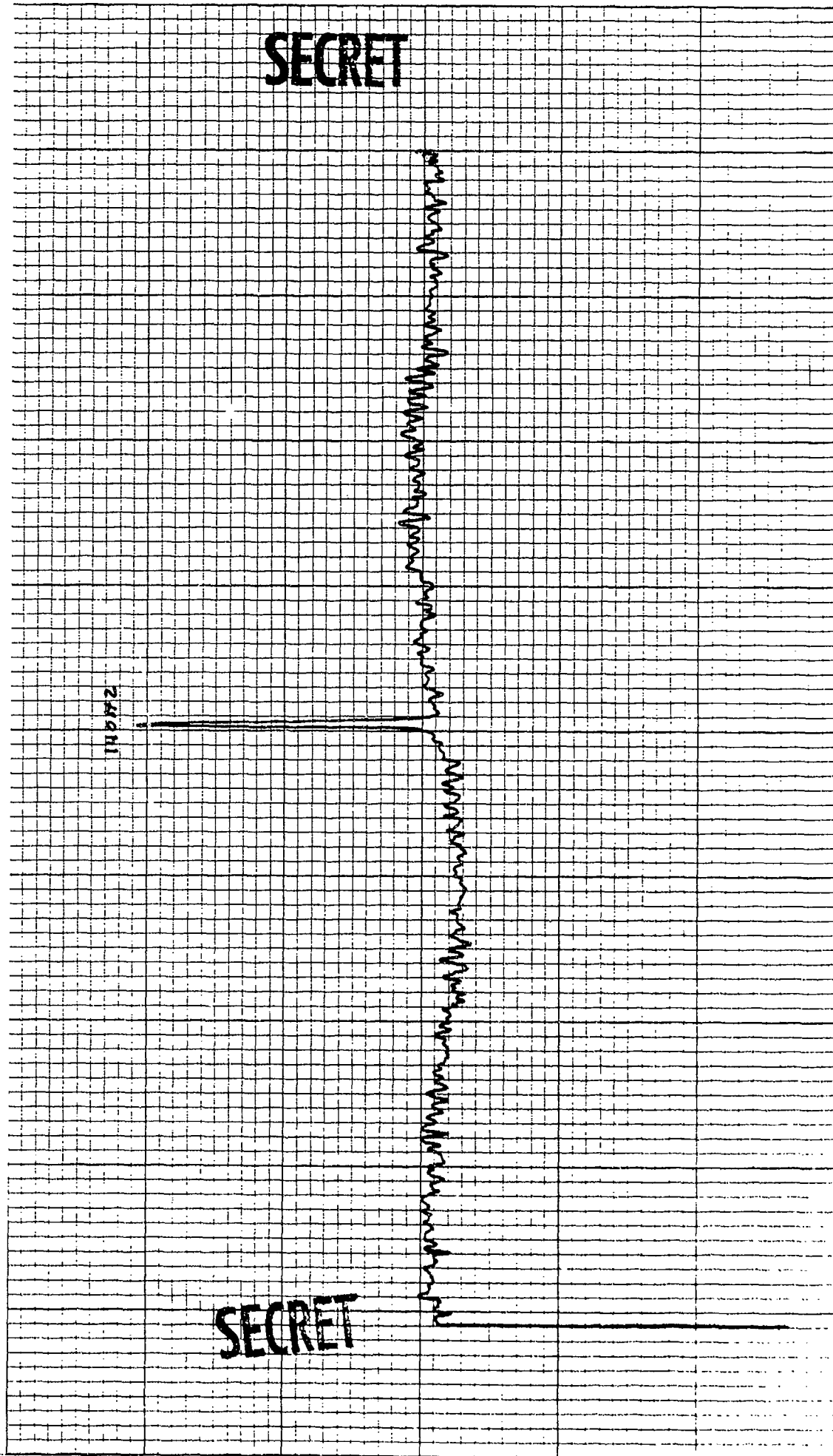
71037

CONTROL: 1148 - 16 (DE12)
BEAMFORMED SPECTRUM (ELEMENTS)
EXERCISE: BEARING STAKE
CENTER FREQ: 140 HZ
16 ELEMENTS

DATE OF ANALYSIS: 1-16
DATE/TIME: 3-16-77 - 1148 Z
ANALYSIS BANDWIDTH: 1/10HZ
+61.5 DEG. AZ STEERING

REEL: N24
INTEGRATION TIME 320 SECS
ATTEN: -18 DB
FILTER WTG: HANNING

INDE X 1996

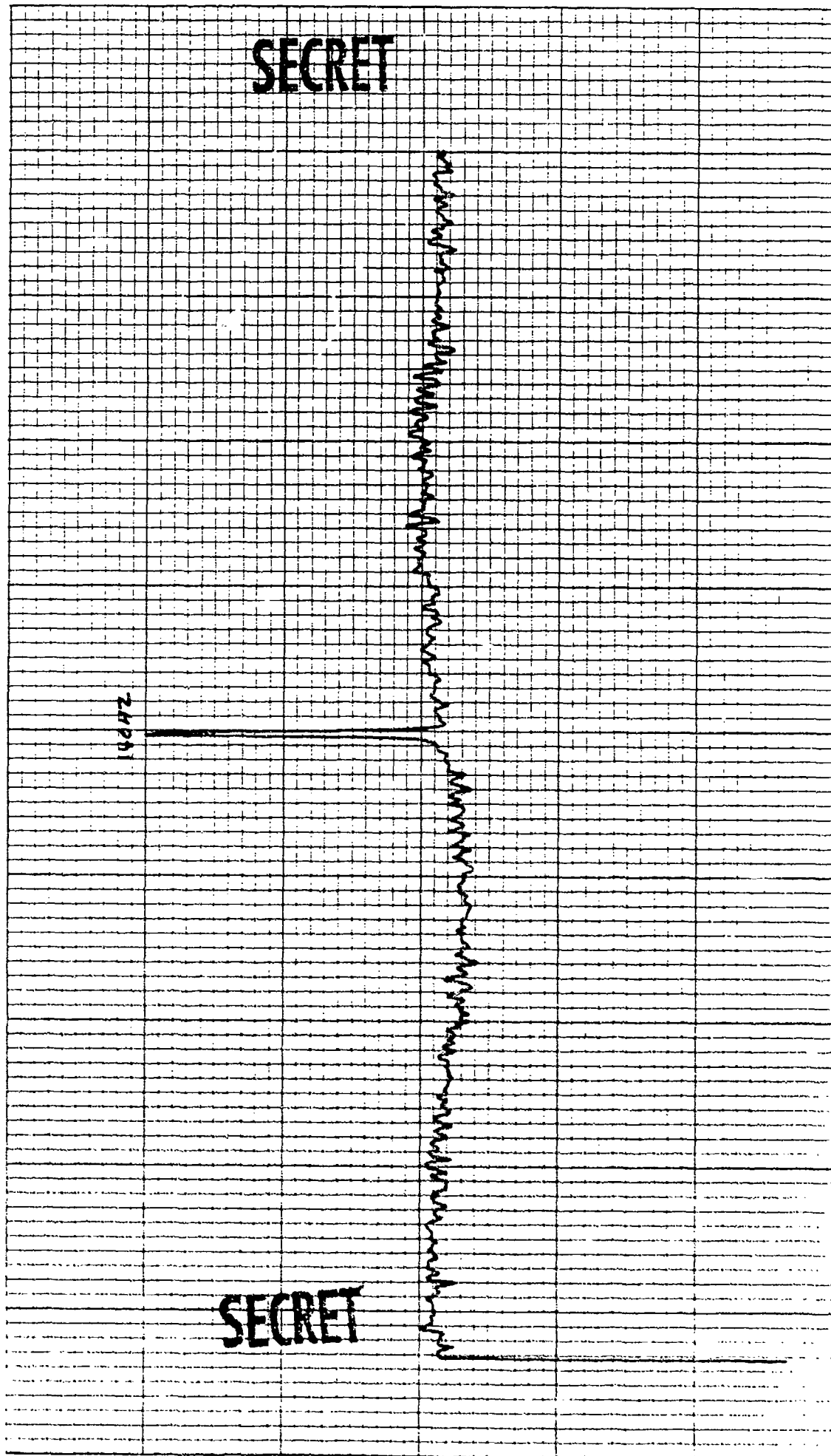


KOE 10 X 10 TO THE INCH • J X 10 INCHES
KEUPTEL A ESSER CO. MADE IN U.S.A.

46 0703

Page 13

CONTROL: 1140 - 16 (DP12) DATE OF ANALYSIS: 1-16) REEL: May INDE X199S
BEAMFORMED SPECTRUM(ELEMENTS) DATE/TIME: 3-16-77 - 1140 Z INTEGRATION TIME 320 SECS ATTN: -18 DB
EXERCISE: BEARING STAKE ANALYSIS BANDWIDTH: 1/10HZ FILTER WTG: HANNING
CENTER FREQ: 140 HZ +62 DEG. AZ STEERING



KOE 10 X 10 TO THE INCH • 7 X 10 INCHES
KEUFFEL & ESSER CO. MADE IN U.S.A.

46 0703

CONTROL: 1148 - 16 (0012)
BEAMFORMED SPECTRUM (ELEMENTS)
EXERCISE: BEARING STAKE
CENTER FREQ: 140 HZ
16 ELEMENTS

DATE OF ANALYSIS: 1-16
DATE/TIME: 3-16-77 - 1148 Z
ANALYSIS BANDWIDTH: 1/10HZ
+63 DEG. AZ STEERING

REEL: M24 INDE X/1995
INTEGRATION TIME 320 SECS
ATTEN: -18 DB
FILTER WTG: HANNING

SECRET

SECRET

140 HZ

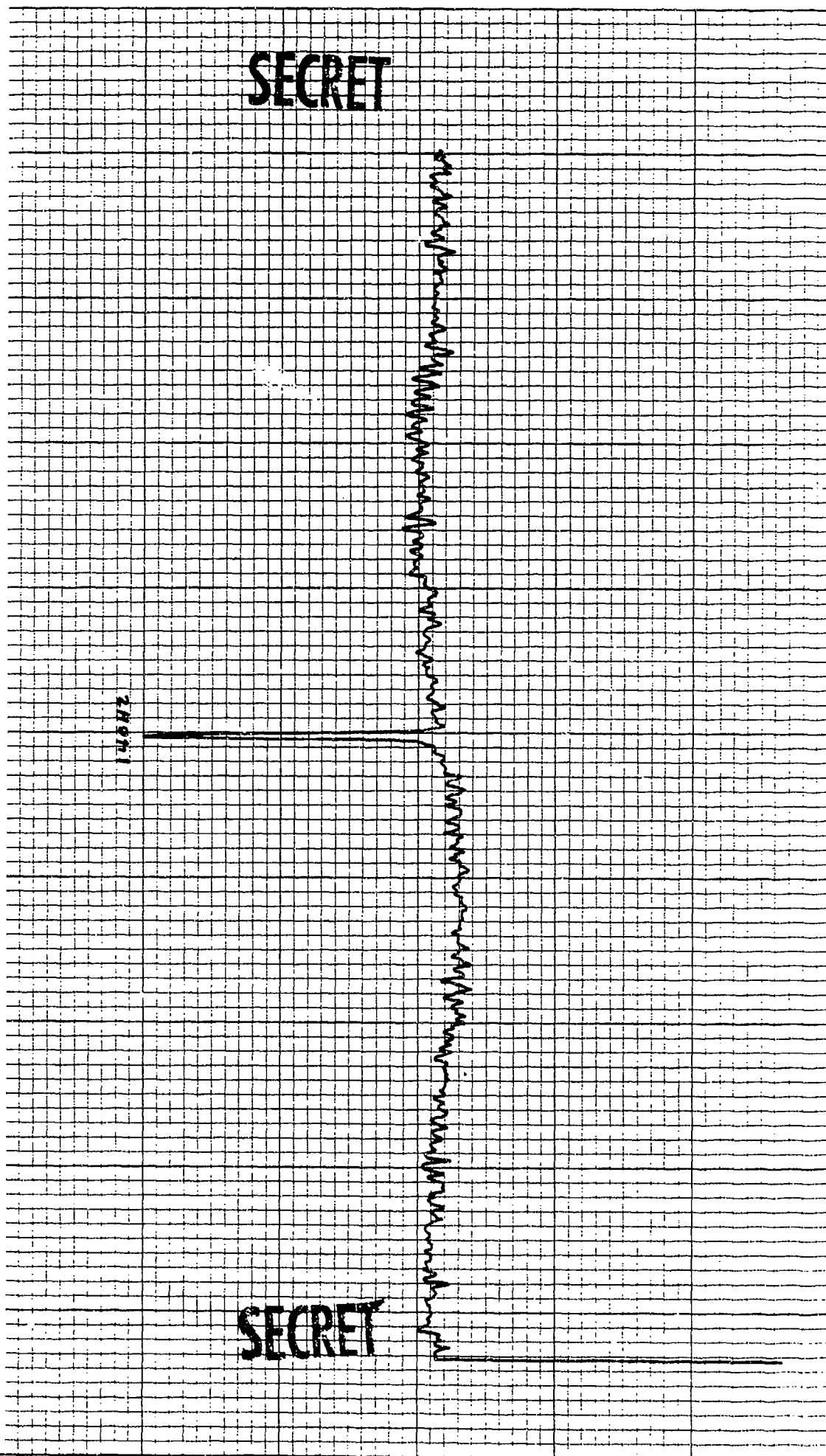
140 HZ

KSE 10 X 10 TO THE INCH • 7 X 10 INCHES
NEUFFEL & ESSER CO. MADE IN U.S.A.

46 0703

81-15

CONTROL: 1140 - 16 (DP12) DATE OF ANALYSIS: 1-16 REEL: M24 INDE X1885-
BEAMFORMED SPECTRUM(ELEMENTS))
EXERCISE: BEARING STAKE DATE/TIME: 3-16-77 - 1140 Z INTEGRATION TIME 320 SECS ATLEN: -10 DB
CENTER FREQ: 140 HZ ANALYSIS BANDWIDTH: 1/10HZ FILTER WTG: HANNING
16 ELEMENTS +44 DEG. AZ STEERING

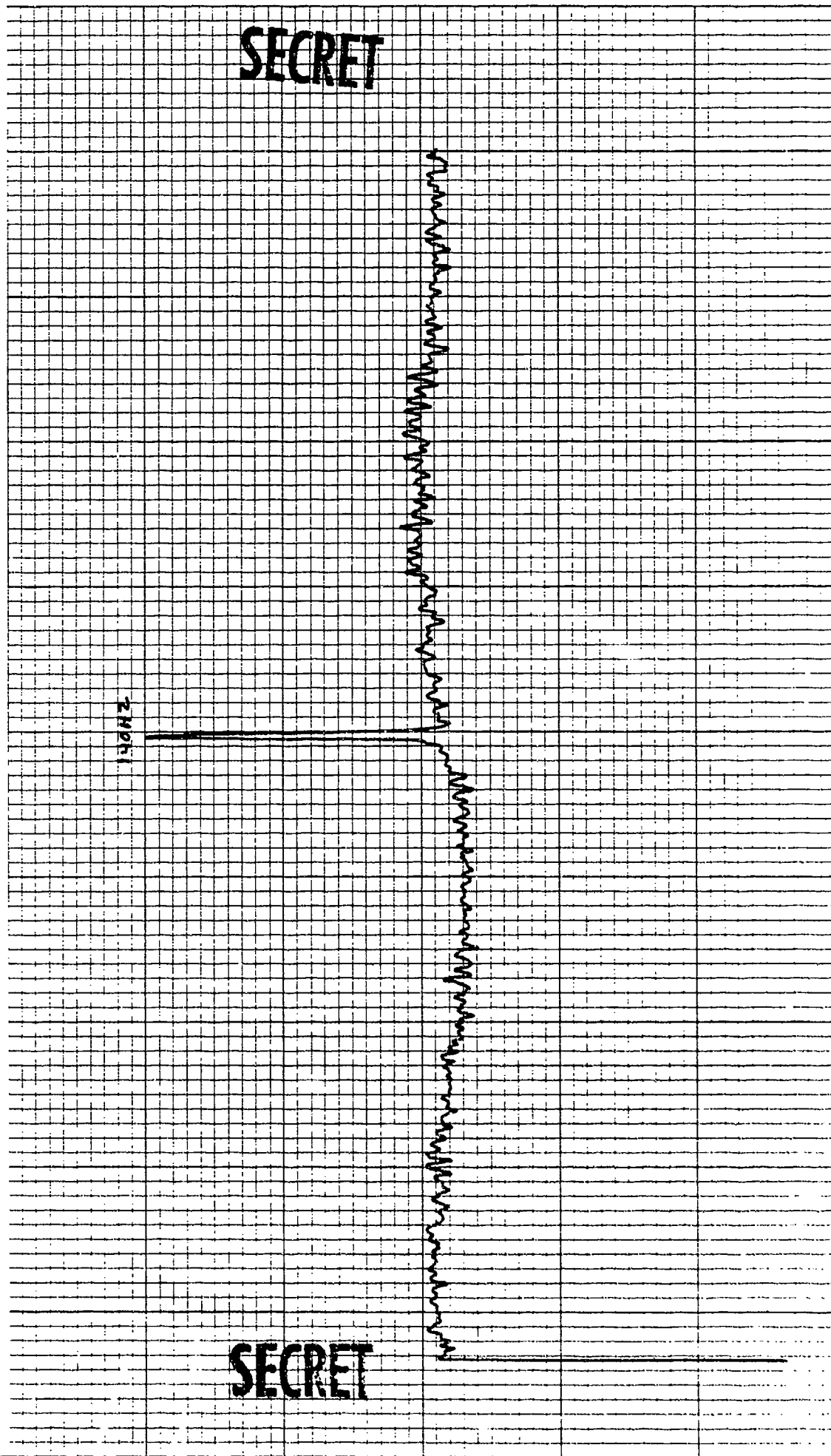


K-2 10 X 10 TO THE INCH • 7 X 10 INCHES
KEUFFEL & ESSER CO. MADE IN U.S.A.

46 0703

7/16/77

CONTROL: 1148 - 16 (DPI2) DATE OF ANALYSIS: 1-16) REEL: M24 INDE X1986
BEAMFORMED SPECTRUM (ELEMENTS) DATE/TIME: 3-16-77 - 1148 Z INTEGRATION TIME 320 SECS ATTN: -10 DB
EXERCISE: BEARING STAKE ANALYSIS BANDWIDTH: 1/10HZ FILTER WTG: HANNING
CENTER FREQ: 140 HZ +66 DEG. AZ STEERING



CONTROL: 1146 - 16 (DPIA)
BEAMFORMED SPECTRUM(ELEMENTS)
EXERCISE: BEARING STAKE
CENTER FREQ: 148 HZ
16 ELEMENTS

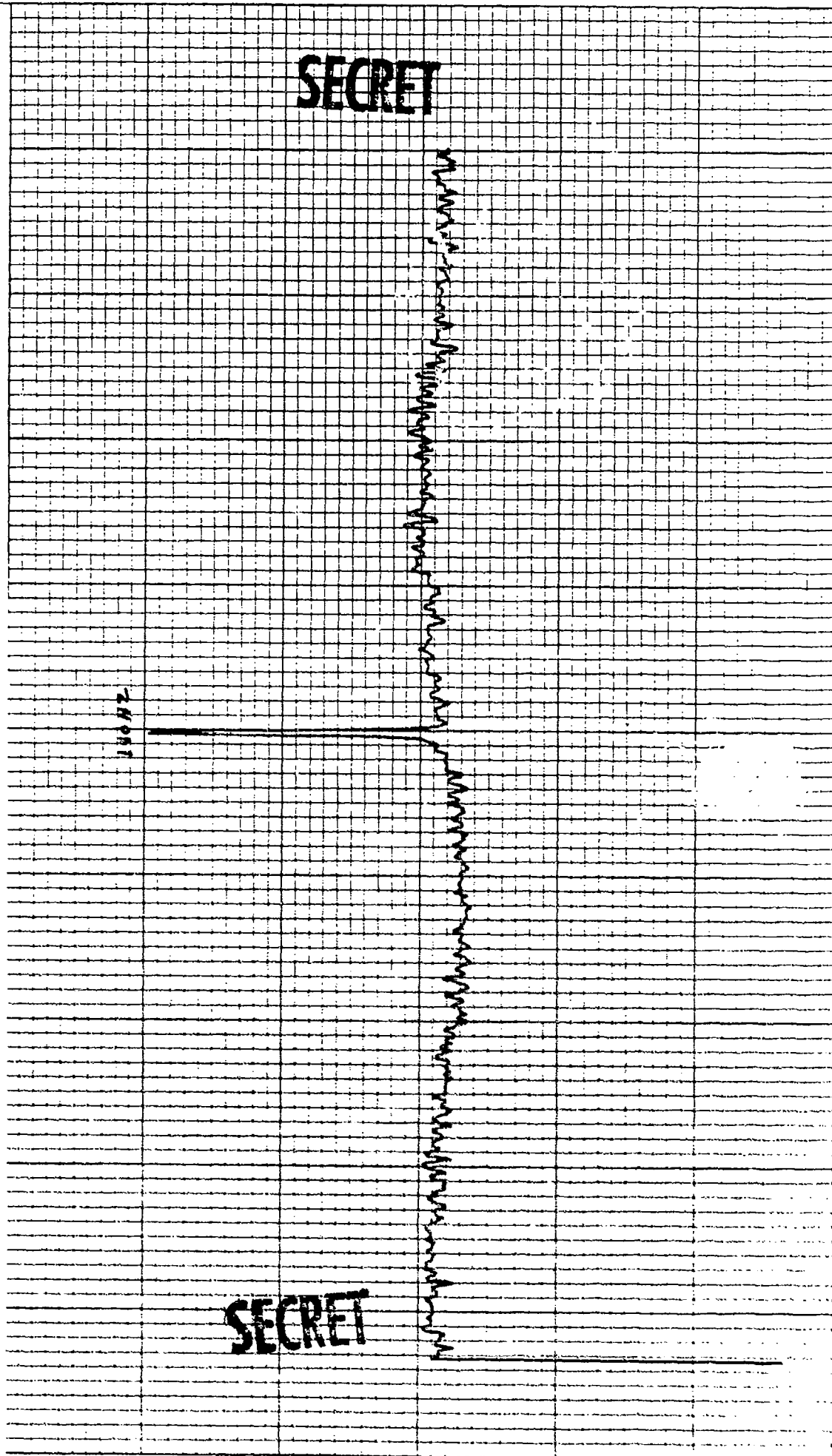
DATE OF ANALYSIS: 1-16
DATE/TIME: 3-16-77-1146 Z
ANALYSIS BANDWIDTH: 1/10HZ
460 DEG. AZ STEERING

REEL: H24
INTEGRATION TIME 320 SECS
ATTEN: -10 DB
FILTER WTG: HANNING

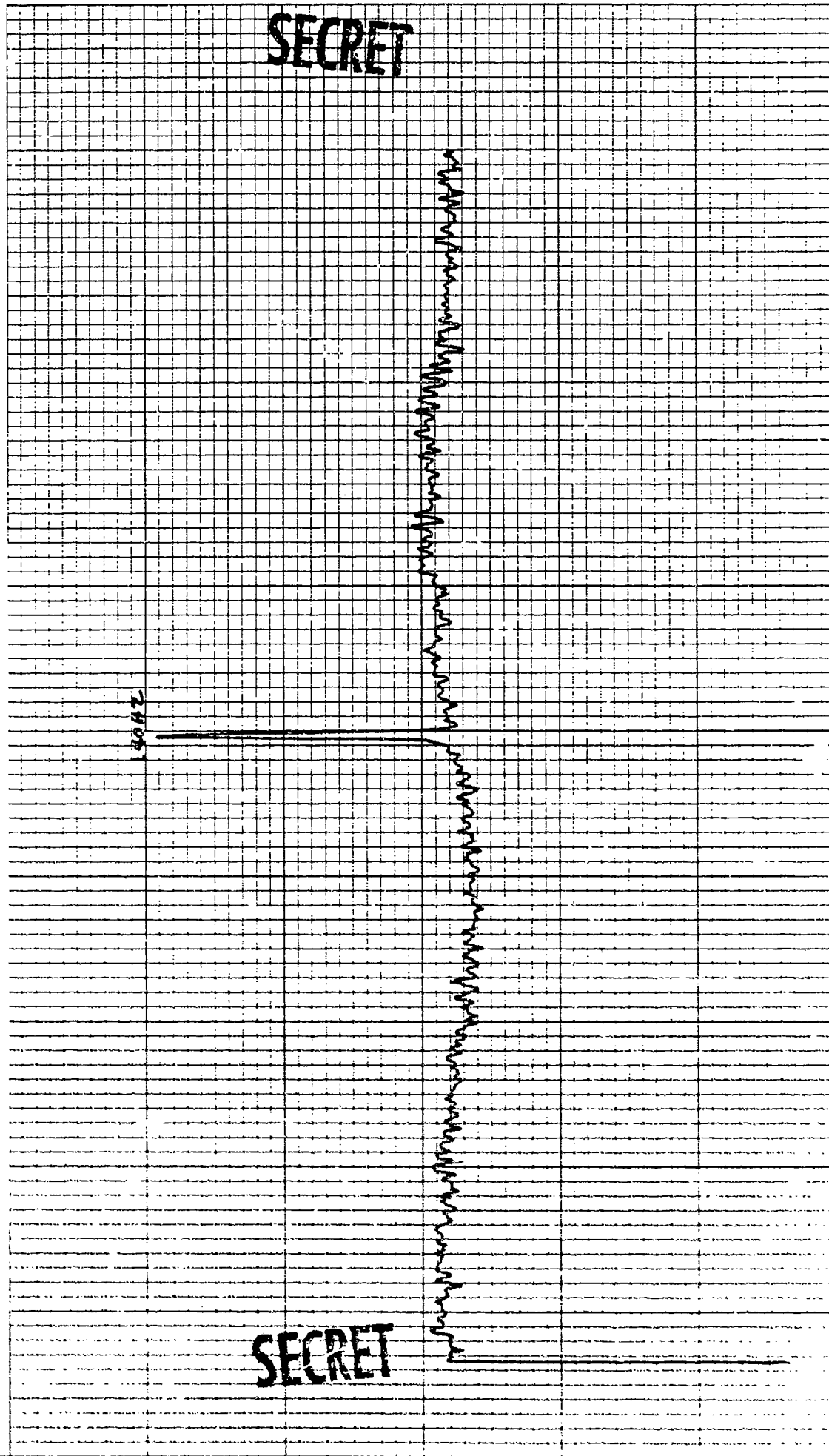
INDE X 1885

SECRET

SECRET



CONTROL: 1148 - 16 (DPR) REEL: 424 INDE X/885
BEAMFORMED SPECTRUM (ELEMENTS) DATE OF ANALYSIS: 1-16
EXERCISE: BEARING STAKE DATE/TIME: 3-6-77 - 1148 Z INTEGRATION TIME 320 SECS ATTEN: -10 DB
CENTER FREQ: 140 HZ ANALYSIS BANDWIDTH: 1/10 HZ FILTER WIG: HANNING
16 ELEMENTS +70 DEG. AZ STEERING



KSE 10 X 10 TO THE INCH 1/2 X 10 INCHES
ALUMINUM & PAPER CO. MADE IN U.S.A.

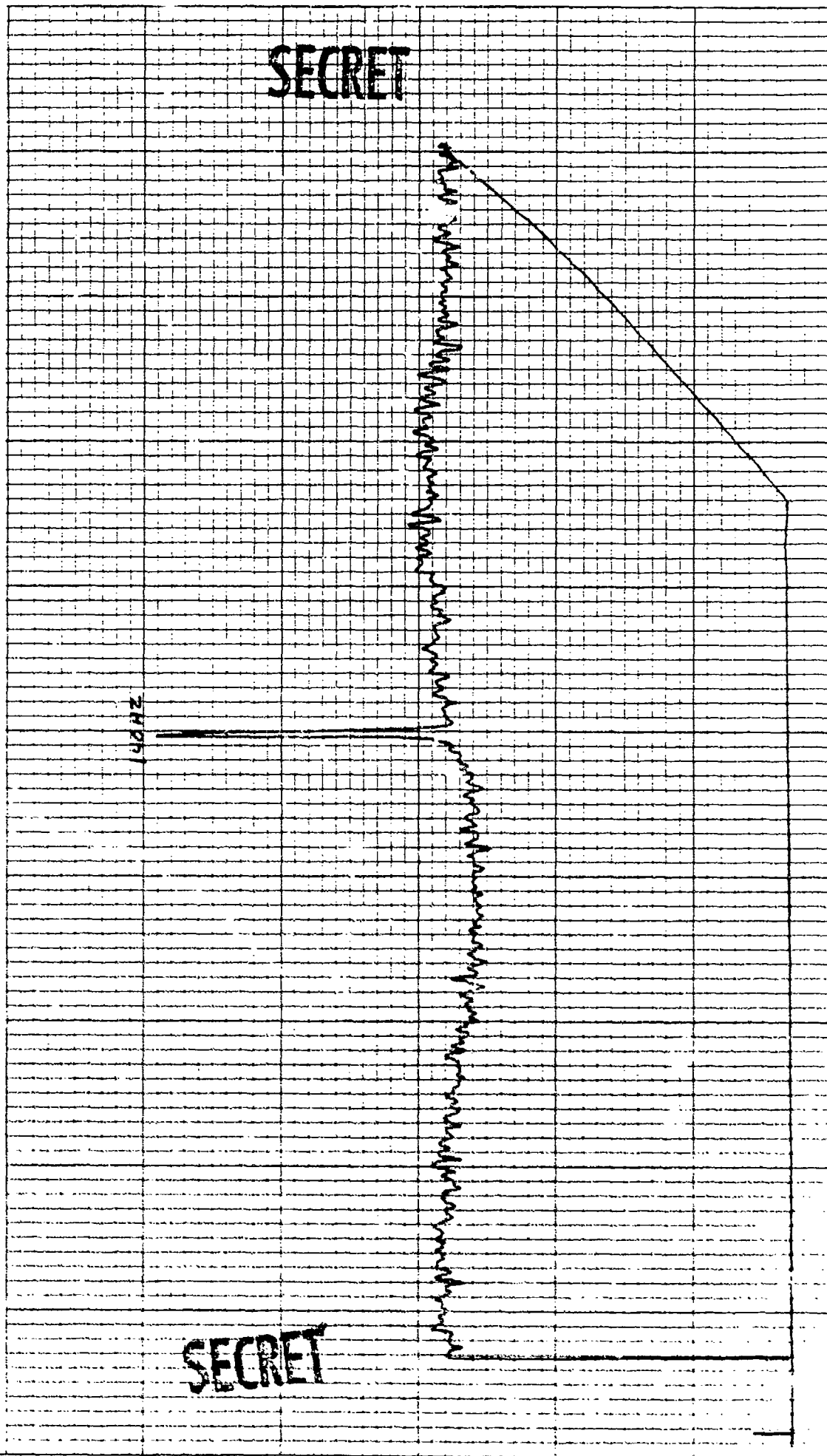
46 0703

CONTROL: 1148 - 16 (DP12)
BEAMFORMED SPECTRUM (ELEMENTS)
EXERCISE: BEARING STAKE
CENTER FREQ: 140 H7
16 ELEMENTS

DATE OF ANALYSIS: 1-16
DATE/TIME: 3-16-77 - 11-2 Z
ANALYSIS BANDWIDTH: 1/10 HZ
+72 DEG. AZ STEERING

REEL: M24
INTEGRATION TIME 320 SECS
FILTER WTG: HANNING

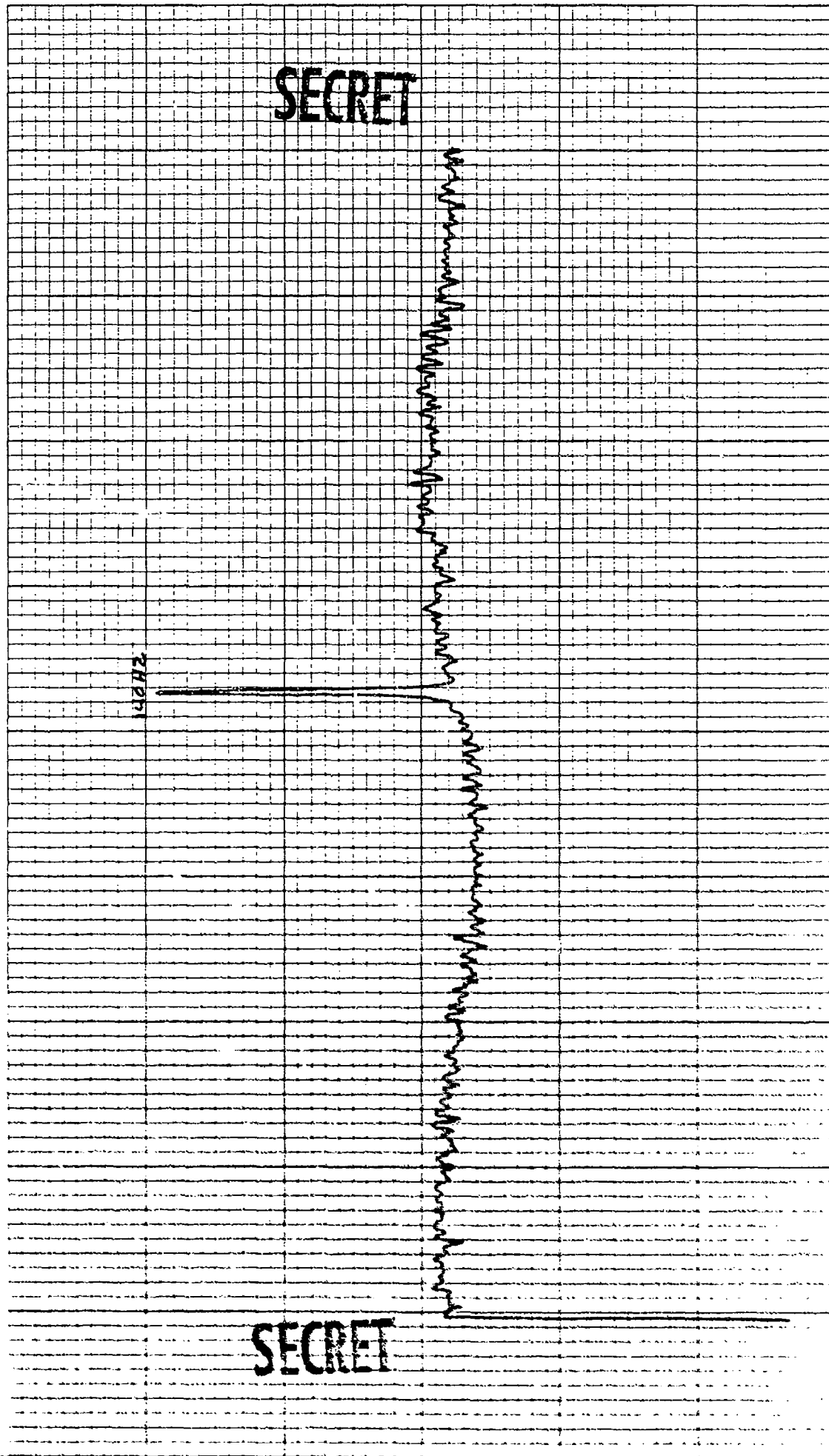
INDE X 1995



CONTROL: 1148 - 16 (DP/2)
BEAMFORMED SPECTRUM (ELEMENTS)
EXERCISE: BEARING STAKE
CENTER FREQ: 140 HZ
16 ELEMENTS

DATE OF ANALYSIS: 1-16
DATE/TIME: 3-16-77 - 1148 Z
ANALYSIS BANDWIDTH: 1/10HZ
+74 DEC. AZ STEERING

REEL: M24
INTEGRATION TIME 320 SECS
FILTER WTG: HANNING
INDE X/1995
ATTEN: -18 DB



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46 0703

16 ELEMENTS

+76 DEG. AZ STEERI 3

INDEX X 1995

INTEGRATION TIME 320 SECS

FILTER WTC: HANNING

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SECRET

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SECRET

SECRET

the above mentioned by the present work. The authors are

10 X 10 TO THE INCH • 7 X 10 INCHES
KEUFEL & ESSER CO. MADE IN U.S.A.

46 0703

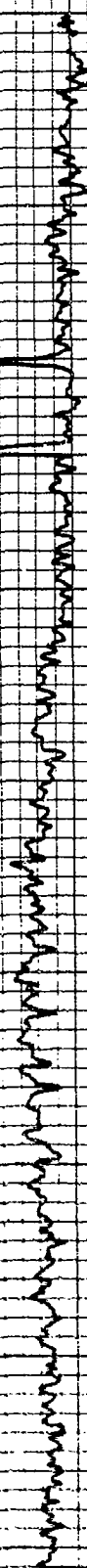
CONTROL: 1148 - 16 QP12) DATE OF ANALYSIS: 1-16)
BEAMFORMED SPECTRUM(ELEMENTS))
EXERCISE: BEARING STAKE)
CENTER FREQ: 270 HZ)
16 ELEMENTS)
REEL: M24 INDE X/195
INTEGRATION TIME 320 SECS ATTN: -18 DB
FILTER WTC: HANNING

DATE/TIME: 3-16-77 - 1148 Z
ANALYSIS BANDWIDTH: 1/10HZ
+ 48 DEG. AZ STEERING

SECRET

SECRET

280 HZ



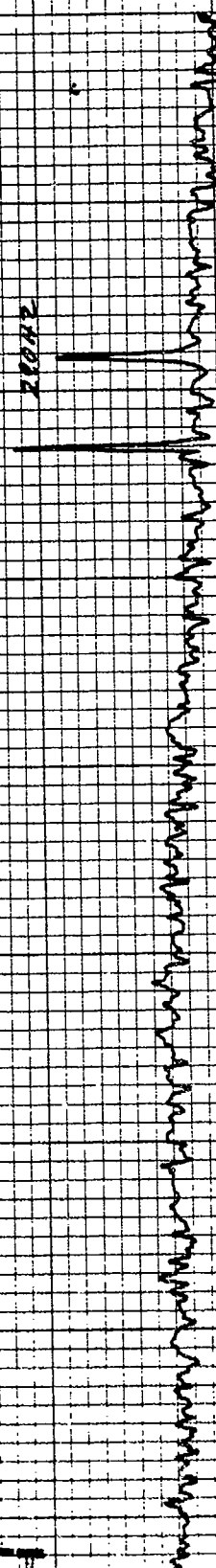
KOE 10 X 10 TO THE INCH 7 X 10 INCHES
KEUFFEL & ESSER CO. MADE IN U.S.A.

46 0703

CONTROL: 1143 - 16 (DPIA) DATE OF ANALYSIS: 1-16
BEAMFORMED SPECTRUM (ELEMENTS) REEL: M34 INDE X1996
EXERCISE: BEARING STAKE INTEGRATION TIME 320 SECS ATTN: 70 DB
CENTER FREQ: 270 HZ FILTER WTG: HANNING
16 ELEMENTS +50 DEG. AZ STEERING

SECRET

SECRET



KΣ 10 X 10 TO THE INCH • 7 X 10 INCHES
HEUFFEL & ESSER CO. MADE IN USA

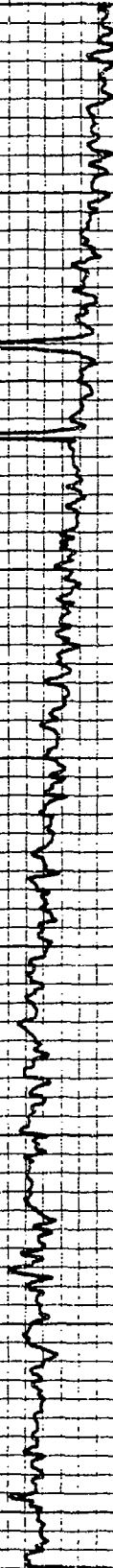
46 0703

CONTROL: 1146 - 16 (DP12) DATE OF ANALYSIS: 1-16) REEL: 124 INDE X/995
BEAMFORMED SPECTRUM(ELEMENTS) DATE/TIME: 3-16-77 - 1148 Z INTEGRATION TIME 320 SECS ATTN: -/0 DB
EXERCISE: BEARING STAKE ANALYSIS BANDWIDTH: 1/10HZ FILTER WTG: HANNING
CENTER FREQ: 270 HZ 452 DEG. AZ STEERING

SECRET

SECRET

1148Z



KSE 10 X 10 TO THE INCH • 1 X 10 INCHES
KEUFFEL & ESSER CO. MADE IN U.S.A.

46 0703

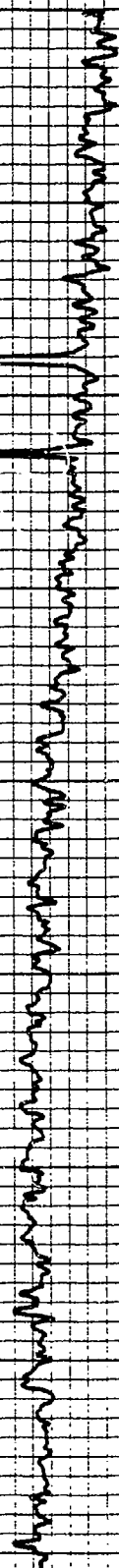
CONTROL: 1148 16 (DP12) DATE OF ANALYSIS: 1-16) REEL: 124 INDE X/995
BEAMFORMED SPECTRUM (ELEMENTS))
EXERCISE: BEARING STAKE)
CENTER FREQ: 270 HZ)
16 ELEMENTS)
DATE/TIME: 3-16-77-1148 Z
ANALYSIS BANDWIDTH: 1/10 HZ
+54 DEG. AZ STEERING

INTEGRATION TIME 320 SECS
ATTEN: -10 DB
FILTER WTG: FANNING

SECRET

SECRET

20000



K-E 10 X 10 TO THE INCH • 7 X 10 INCHES
KEUFFEL & ESSER CO. MADE IN U.S.A.

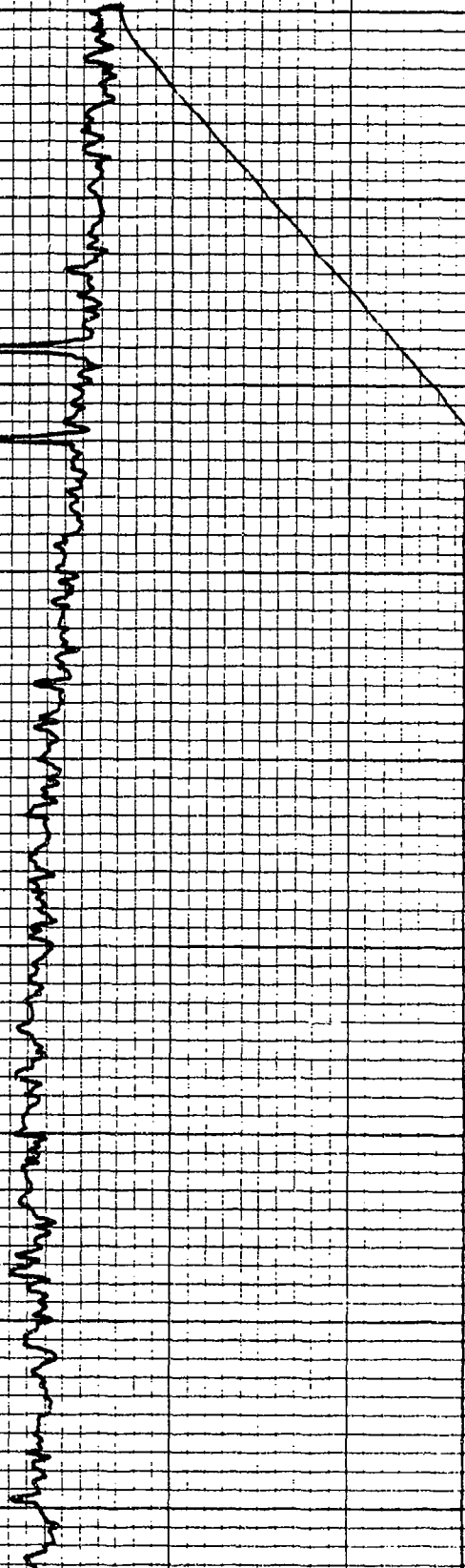
46 0703

CONTROL: 1148 - 16 (DP12) REEL: 424 INDE X 1995
BEAMFORMED SPECTRUM (ELEMENTS)
EXERCISE: BEARING STAKE
CENTER FREQ: 270 HZ
16 ELEMENTS
DATE OF ANALYSIS: 1-16
DATE/TIME: 3-16-77 - 1148 Z
ANALYSIS BANDWIDTH: 1/10 HZ
+56 DEG. AZ STEERING
INTEGRATION TIME 320 SECS
FILTER WTG: HANNING
ATTEN: -10 DB

SECRET

SECRET

22002



K-Σ 10 X 10 TO THE INCH • 7 X 10 INCHES
KEUFFEL & ESSER CO. MADE IN U.S.A.

46 0703

CONTROL: 1140 - 16 (DP12)
BEAMFORMED SPECTRUM(ELEMENTS)
EXERCISE: BEARING STAKE
CENTER FREQ: 270 HZ
16 ELEMENTS

DATE OF ANALYSIS: 1-16
DATE/TIME: 3-6-77 - 1148 Z
ANALYSIS BANDWIDTH: 1/10 HZ
150 DEG. AZ STEERING

REEL: 1124

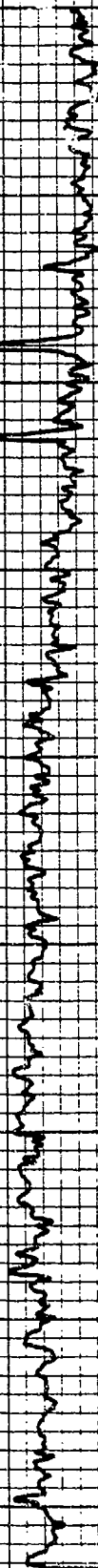
INDE X 1895

INTEGRATION TIME 320 SECS
ATTEN: 70 DB
FILTER WTG: HANNING

SECRET

220412

SECRET



K-10 10 X 10 TO THE INCH 7 X 10 INCHES
NEUFEL & ESSER CO. MADE IN U.S.A.

46 0703

CONTROL: 1140 - 16 (DP12)
BEAMFORMED SPECTRUM(ELEMENTS)
EXERCISE: BEARING STAKE
CENTER FREQ: 370 HZ
16 ELEMENTS

DATE OF ANALYSIS: 1-16)
DATE/TIME: 3-16-77 - 1140 Z
ANALYSIS BANDWIDTH: 1/10HZ
+59 DEG. AZ STEERING

REEL: MAY INDE X1995
INTEGRATION TIME 320 SECS
ATTEN: 70 DB
FILTER WTG: HANNING

SECRET

SECRET

270002

When the bearing stake is used, the bearing stake is used to determine the bearing of the target. The bearing stake is used to determine the bearing of the target. The bearing stake is used to determine the bearing of the target.

K-2 10 X 10 TO THE INCH • 7 X 10 INCHES
KEUFFEL & ESSER CO. MADE IN U.S.A.

46 0703

7/1/12

CONTROL: 1148 - 16 (DP12)
BEAMFORMED SPECTRUM(ELEMENTS)
EXERCISE: BEARING STAKE
CENTER FREQ: 270 HZ
16 ELEMENTS

DATE OF ANALYSIS: 1-16
DATE/TIME: 3-16-77 - 1148 Z
ANALYSIS BANDWIDTH: 1/10HZ
+60 DEG. AZ STEERING

REEL: M24 INDE X 1985
INTEGRATION TIME 320 SECS
ATTEN: -18 DB
FILTER WTG: HANNING

SECRET

SECRET

200012

Handwritten notes and a large 'X' mark on the graph grid.

MSE 10 X 10 TO THE INCH • 7 X 10 INCHES
KEUFFEL & ESSER CO. MADE IN U.S.A.

46 0703

CONTROL: 1146 - 16 (DP12) REEL: M34 INDE X1995
BEAMFORMED SPECTRUM (ELEMENTS) 1-16
EXERCISE: BEARING STAKE DATE/TIME: 3-6-77 - 1146 Z
CENTER FREQ: 270 HZ ANALYSIS BANDWIDTH: 1/10 HZ
16 ELEMENTS +61 DEG. AZ STEERING
INTEGRATION TIME 320 SECS ATTEN: -18 DB
FILTER WTG: HANNING

SECRET

SECRET

220002

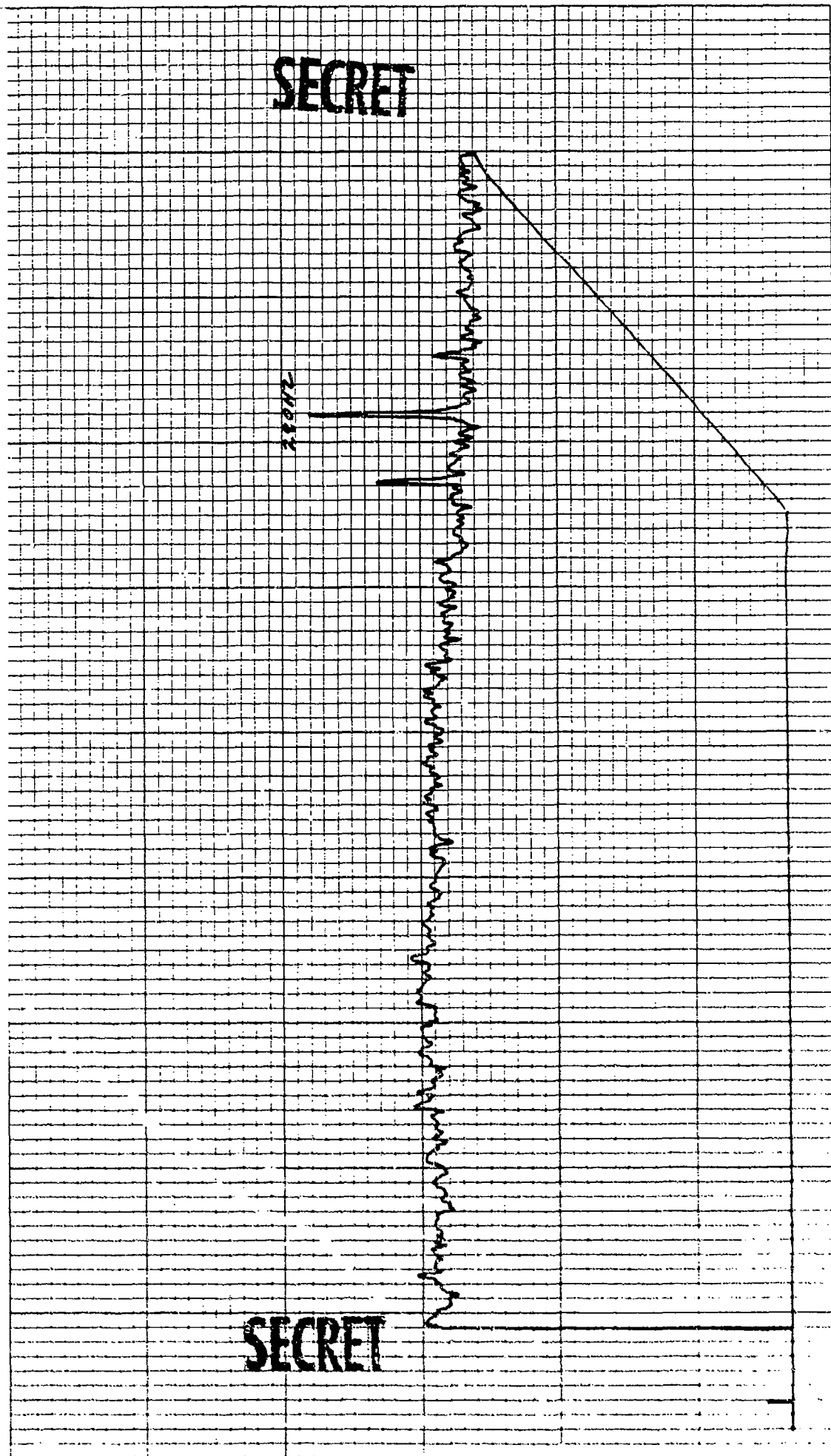
[Handwritten signature/initials across the grid]

KOE 10 X 10 TO THE INCH • 3 X 10 INCHES
KEUFFEL & ESSER CO. MADE IN U.S.A.

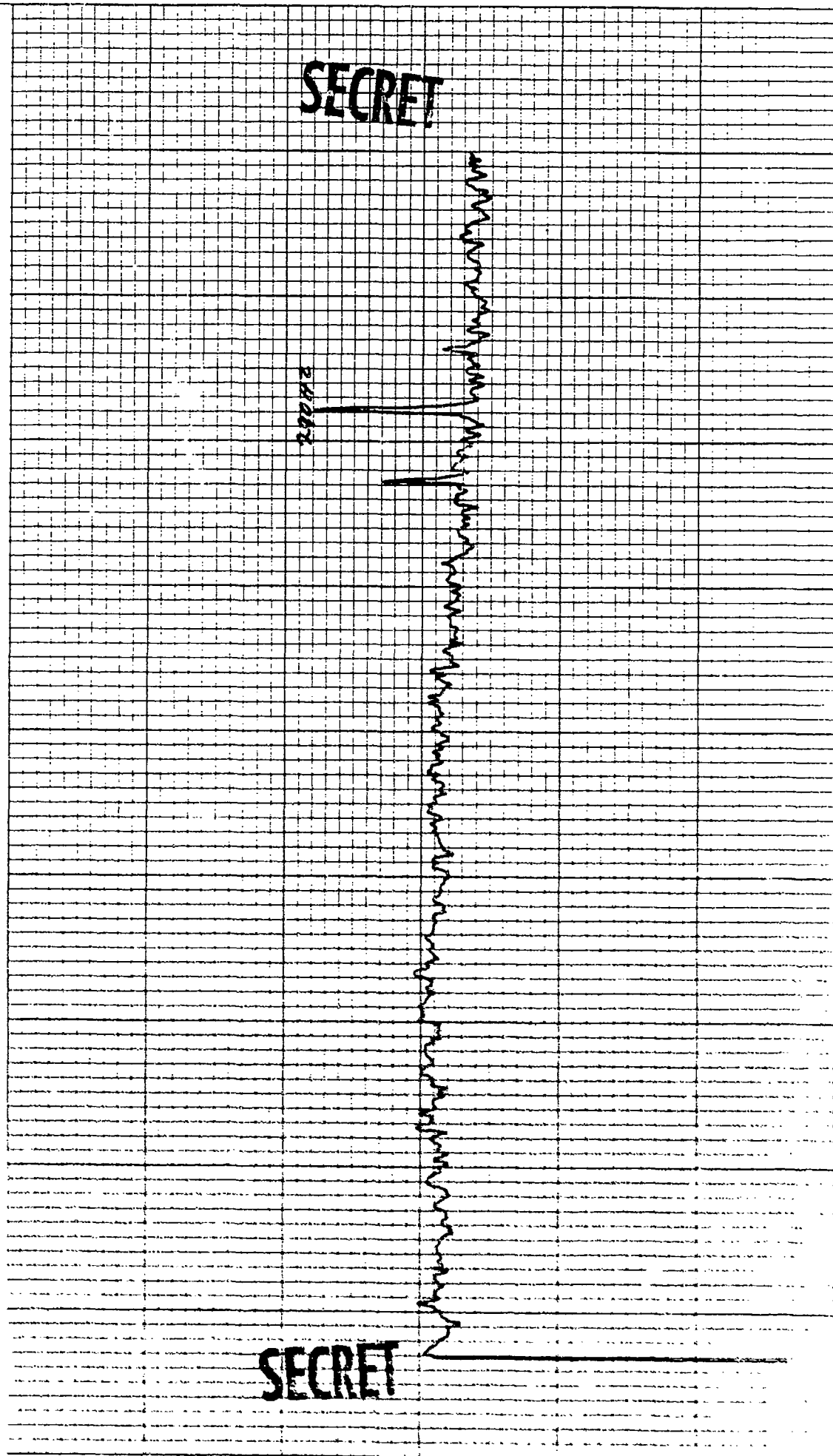
46 0703

7/16/54

CONTROL: 1146 - 16 (DP12) REEL: 1124 INDE X 1995
BEAMFORMED SPECTRUM (ELEMENTS) DATE OF ANALYSIS: 1-16
EXERCISE: BEARING STAKE DATE/TIME: 3-16-77 - 1148 Z INTEGRATION TIME 320 SECS ATTN: DB
CENTER FREQ: 270 HZ ANALYSIS BANDWIDTH: 1/10 HZ FILTER WTG: HANNING
16 ELEMENTS +61.5 DEG. AZ STEERING



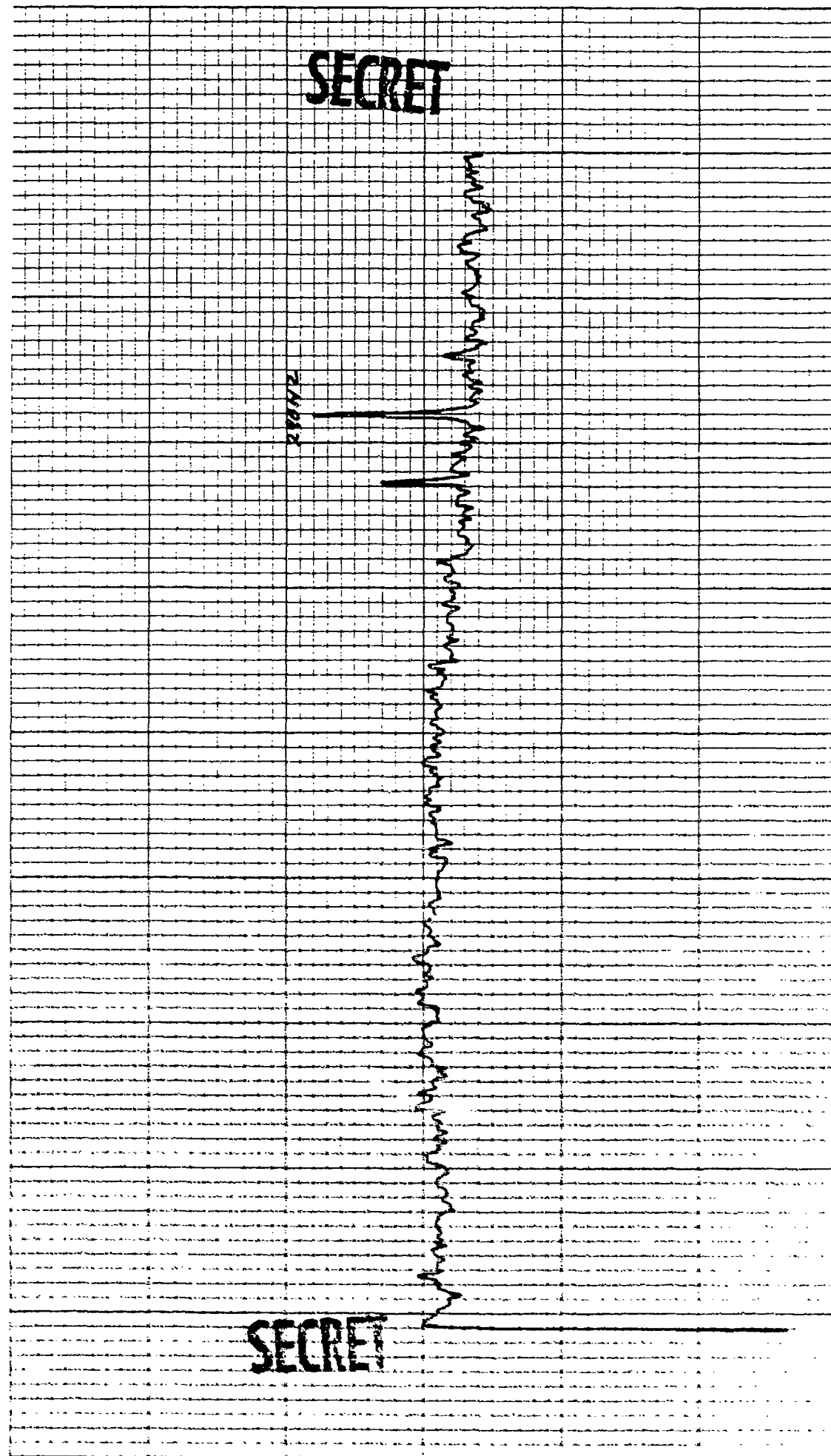
CONTROL: 1140 - 16 (0012) DATE OF ANALYSIS: 1-16 REEL: 404 INDE X 1005
 BEAMFORMED SPECTRUM(ELEMENTS) DATE/TIME: 3-16-77-1148 Z INTEGRATION TIME 320 SECS ATTN: 10 DB
 EXERCISE: BEARING STAKE ANALYSIS BANDWIDTH: 1/10HZ FILTER WTG: HANNING
 CENTER FREQ: 270 HZ 16 ELEMENTS 402 DEG. AZ STEERING



10 X 10 TO THE INCH
NEUFEL & PUGH CO. MADE IN U.S.A.

46 0703

CONTROL: 140 - 16 (2012) DATE OF ANALYSIS: 1-16 REEL: M24 INDE X1965
BEAMFORMED SPECTRUM (ELEMENTS))
EXERCISE: BEARING STAKE DATE/TIME: 7-16-77 - 1140 Z INTEGRATION TIME 320 SECS ATTN: -10 DB
CENTER FREQ: 270 HZ ANALYSIS BANDWIDTH: 1/10 HZ FILTER WTG: HANNING
16 ELEMENTS 433 DEG. AZ STEERING



46 0703

INDEX 1995

REEL: 434

INTEGRATION TIME 320 SECS ATTN:-10 DB
 FILTER WTC: HANNING

0 SECS
FILTER

CONTROL: 1140 - 16 (0812)
BEAMFORMED SPECTRUM(ELEMENTS
EXERCISE: BEARING STAKE
CENTER FREQ: 270 HZ
16 ELEMENTS

DATE OF ANALYSIS: 1-16)
DATE/TIME: 3-16-77 - 1140 Z
ANALYSIS BANDWIDTH: 1/10HZ
+64 DEG. AZ STEERING

DATE OF ANALYSIS: — — —

DATE/TIME: 3-16-77 - 1148 Z

ANALYSIS BANDWIDTH: 1/10HZ

+64 DEG. AZ STEERING

SECRET

22

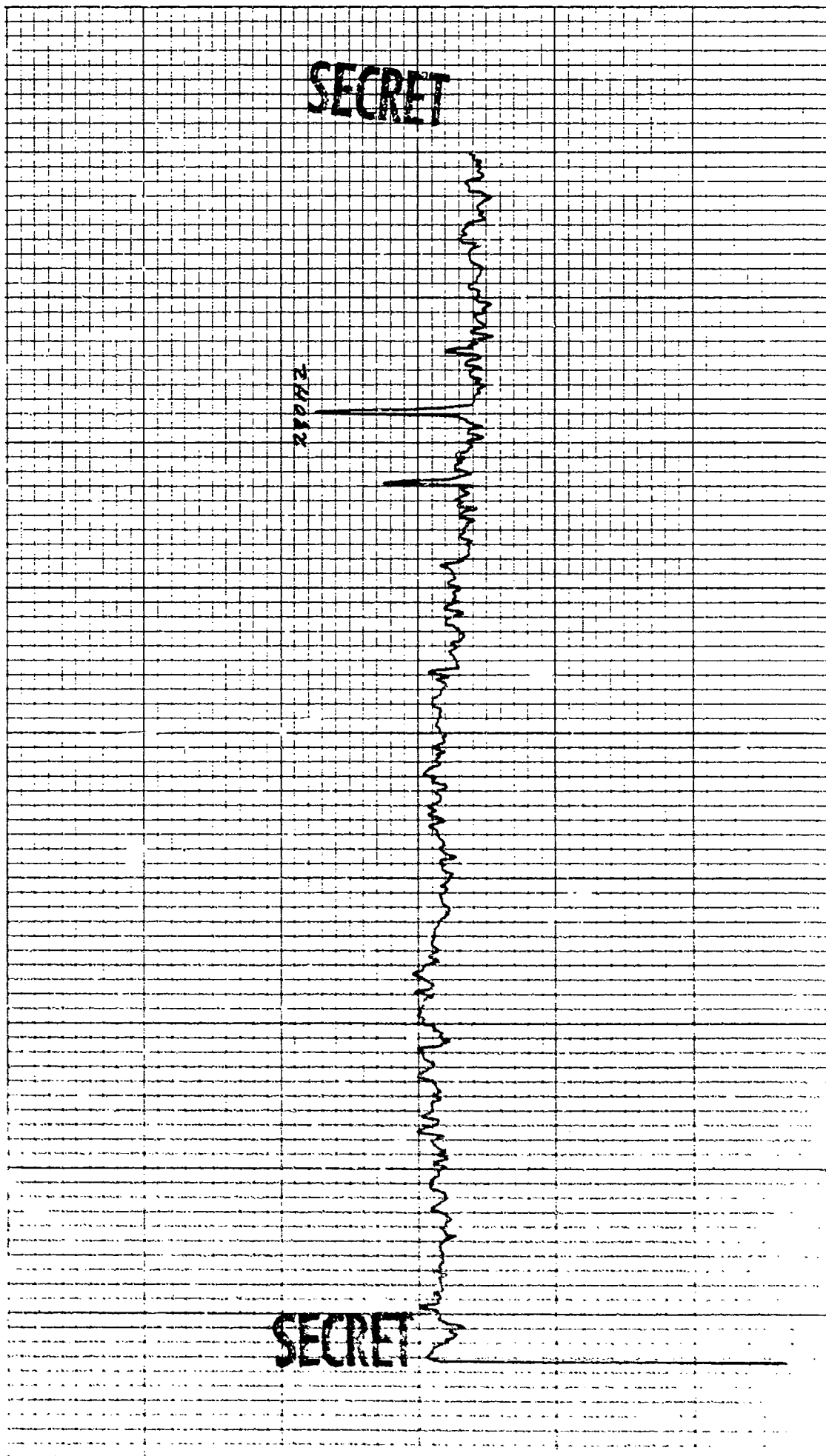
SECRET

CONTROL: 1140 - 16 (DP/2)
 BEAMFORMED SPECTRUM (ELEMENTS)
 EXERCISE: BEARING STAKE
 CENTER FREQ: 270 HZ
 16 ELEMENTS

DATE OF ANALYSIS: 1-16
 DATE/TIME: 3-16-77 - 1148 Z
 ANALYSIS BANDWIDTH: 1/10 HZ
 166 DEG. AZ STEERING

REEL: 404
 INTEGRATION TIME 320 SECS
 FILTER
 WTG: HANNING

INDE X 1995
 ATTN: 78 DR



10 X 10 TO THE INCH - 1 X 10 INCHES
KEUFFEL & ESSER CO. MADE IN U.S.A.

46 0703

CONTROL: 1140 - 16 (2P12) DATE OF ANALYSIS: 1-16 REEL: M24 INDE X1995
BEAMFORMED SPECTRUM(ELEMENTS))
EXERCISE: BEARING STAKE DATE/TIME: 3-16-77 - 1140 Z INTEGRATION TIME 320 SECS ATTN: -19 DB
CENTER FREQ: 270 HZ ANALYSIS BANDWIDTH: 1/10HZ FILTER WTG: HANNING
16 ELEMENTS +60 DEG. AZ STEERING

SECRET

200HZ

SECRET

10 X 10 TO THE INCHES 10 INCHES
REUPREL A. ESKEN CO. MATH. M.D.A.

46 0703

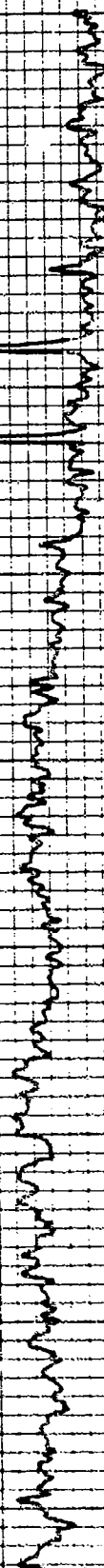
16 2 2

CONTROL: 1148 - 16 (DP12) DATE OF ANALYSIS: 1-16 REEL: 104 INDE X 1985
BEAMFORMED SPECTRUM (ELEMENTS) 1-16
EXERCISE: BEARING STAKE DATE/TIME: 3-6-77-1148 Z INTEGRATION TIME 320 SECS ATTEN: -18 DB
CENTER FREQ: 270 HZ ANALYSIS BANDWIDTH: 1/10HZ FILTER WTG: HANNING
16 ELEMENTS 70 DEG. AZ STEERING

SECRET

SECRET

100 Hz



KOE 10 X 10 TO THE INCH .7 X 10 INCHES
KEUFFEL & ESSER CO. MADE IN U.S.A.

46 0703

Ref

CONTROL: 1148 - 16 (DP12) DATE OF ANALYSIS: 1-16 INDE X/005
BEAMFORMED SPECTRUM(ELEMENTS) 1-16
EXERCISE: BEARING STAKE DATE/TIME: 3-16-77-1148 Z ATTEN: -18 DB
CENTER FREQ: 270 HZ ANALYSIS BANDWIDTH: 1/10HZ FILTER WTG: HANNING
16 ELEMENTS +72 DEG. AZ STEERING

SECRET

SECRET

280002

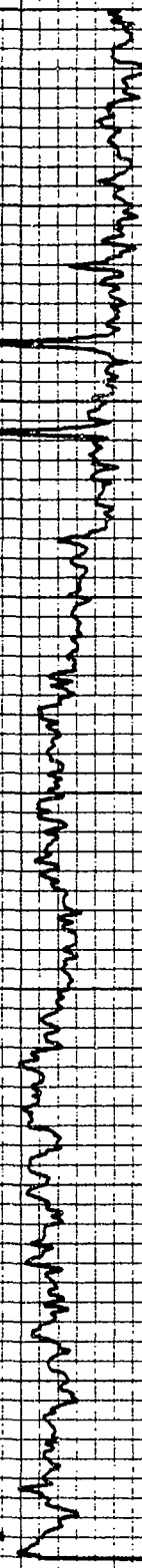
When the bearing stake is used, the bearing stake is used to determine the bearing of the target. The bearing stake is used to determine the bearing of the target. The bearing stake is used to determine the bearing of the target.

CONTROL: 1148 - 16 (0812) DATE OF ANALYSIS: 1-16 REEL: 434 INDE X/105
BEAMFORMED SPECTRUM (ELEMENTS) DATE/TIME: 3-16-77 - 1148 Z INTEGRATION TIME 320 SECS ATTN: 70 DB
EXERCISE: BEARING STAKE ANALYSIS BANDWIDTH: 1/10HZ FILTER WTG: HANNING
CENTER FREQ: 270 HZ +74 DEG. AZ STEERING

SECRET

SECRET

280000



216/28

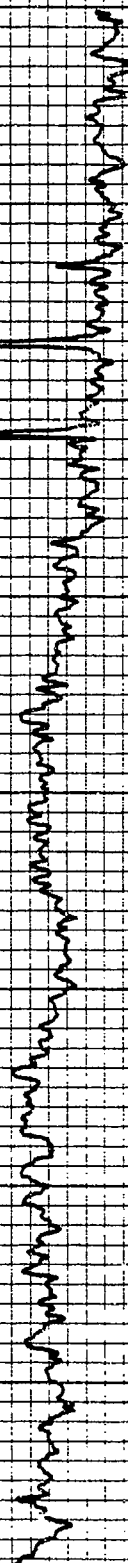
CONTROL: 1140 - 16 (DP12) REEL: 1140 INDE X 1140
BEAMFORMED SPECTRUM (ELEMENTS) INTEGRATION TIME 320 SECS ATTN: -10 DB
EXERCISE: BEARING STAKE FILTER WTG: HANNING
CENTER FREQ: 270 HZ
16 ELEMENTS

DATE OF ANALYSIS: - - -
1-16
DATE/TIME: 3-16-77 - 1140 Z
ANALYSIS BANDWIDTH: 1/10HZ
+76 DEG. AZ STEERING

SECRET

SECRET

280 HZ



K•E 10 X 10 TO THE INCH • 7 X 10 INCHES
KEUFFEL & ESSER CO. MADE IN U.S.A.

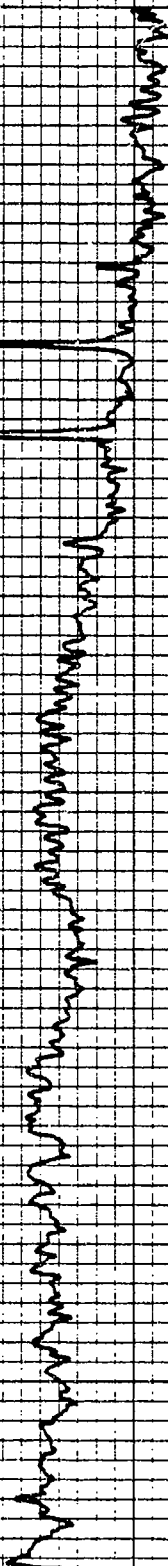
46 0703

CONTROL: 1140 - 16 (D12) DATE OF ANALYSIS: 1-6
BEAMFORMED SPECTRUM(ELEMENTS) REEL: M24 INDE X 1995
EXERCISE: BEARING STAKE INTEGRATION TIME 320 SECS ATTEN: 70 DB
CENTER FREQ: 270 HZ FILTER WTG: HANNING
16 ELEMENTS + 70 DEG. AZ STEERING

SECRET

SECRET

2537.0



CONFIDENTIAL

SIGNAL LEVEL AND SNR

CALCULATIONS

DATA POINT 12

FREQUENCY 140 HZ

NUMBER OF ELEMENTS 32

SIGNAL LEVEL

MCPS-32 SIGNAL LEVEL INDICATED -18.9 dBV

MCPS-32 CAL. CORRECTION +10 -8.9

BEAMFORMER GAIN +18 +9.1 SIG. LEVEL FOR SNR CALCULATION

MRA CORRECTION + .2 +9.3 SIG. LEVEL FOR SIGNAL GAIN

NOISE LEVEL

MCPS-32 SIGNAL LEVEL INDICATED -50.6 dBV

MCPS-32 CAL. CORRECTION +10 -40.6

BEAMFORMER GAIN +18 -22.6 NOISE LEVEL FOR SNR CALCULATION

SIGNAL-NOISE-RATIO

SIGNAL LEVEL FOR SNR +9.1

NOISE LEVEL FOR SNR -22.6 31.7

PROCESSOR CORRECTION - 4 27.7

MRA CORRECTION + .2 27.9 SNR .013 HZ BAND

BANDWIDTH CONVERSION _____ SNR 1 HZ BAND

CONFIDENTIAL

CONFIDENTIAL

SIGNAL LEVEL AND SNR

CALCULATIONS

DATA POINT 12

FREQUENCY 290 HZ

NUMBER OF ELEMENTS 32

SIGNAL LEVEL

MCPS-32 SIGNAL LEVEL INDICATED -35.8 dBV

MCPS-32 CAL. CORRECTION +10 -25.8

BEAMFORMER GAIN +18 - 7.8 SIG. LEVEL FOR SNR CALCULATION

MRA CORRECTION + .9 - 6.9 SIG. LEVEL FOR SIGNAL GAIN

NOISE LEVEL

MCPS-32 SIGNAL LEVEL INDICATED -54.6 dBV

MCPS-32 CAL. CORRECTION +10 -44.6

BEAMFORMER GAIN +18 -26.6 NOISE LEVEL FOR SNR CALCULATION

SIGNAL-NOISE-RATIO

SIGNAL LEVEL FOR SNR -7.8

NOISE LEVEL FOR SNR -26.6 18.8

PROCESSOR CORRECTION -4.2 14.6

MRA CORRECTION + .9 15.5 SNR .013 HZ BAND

BANDWIDTH CONVERSION _____ SNR 1 HZ BAND

CONFIDENTIAL

CONFIDENTIAL

DATA POINT 12SIGNAL GAIN

	<u>140 HZ</u>	<u>290HZ</u>	<u>295HZ</u>
MEAN OMNI SIGNAL LEVEL	<u>-24.8</u>	<u>-38.6</u>	<u> </u>
MRA SIGNAL LEVEL	<u>+9.3</u>	<u>-6.9</u>	<u> </u>
ARRAY SIGNAL GAIN	<u>34.1</u>	<u>31.7</u>	<u> </u>
20 LDG <u>32</u>	<u>30.1</u>	<u>30.1</u>	<u> </u>
# of elements			
DIFFERENCE	<u>+4.0</u>	<u>+1.6</u>	<u> </u>

ARRAY GAIN

MRA SNR	<u>27.9</u>	<u>15.5</u>	<u> </u>
MEAN OMNI SNR	<u>19.4</u>	<u>7.9</u>	<u> </u>
ARRAY GAIN	<u>8.5</u>	<u>7.6</u>	<u> </u>
THEORETICAL AZMUTH GAIN (at MRA)	<u>10.6</u>	<u>13.4</u>	<u> </u>
DIFFERENCE	<u>-2.1</u>	<u>-5.8</u>	<u> </u>

CONFIDENTIAL

K-5 10 X 10 TO THE INCH • 7 X 10 INCHES
ALUMINUM & BRASS CO. MADE IN U.S.A.

46 0703

CONTROL: 1140 - 32 (0112) DATE OF ANALYSIS: 1-26-77 REEL: 424 INDE X1095
BEAMFORMED SPECTRUM (ELEMENTS))
EXERCISE: BEARING STAKE DATE/TIME: 3-26-77 - 1140 Z INTEGRATION TIME 320 SECS ATTN: -10 DB
CENTER FREQ: 140 HZ ANALYSIS BANDWIDTH: 1/10HZ FILTER WTG: HANNING
32 ELEMENTS +48 DEG. AZ STEERING

SECRET

140 HZ

SECRET



KOE 10 X 10 TO THE INCH - X 10 INCHES
NEUTRAL A PAPER CO. WASHINGTON D.C.

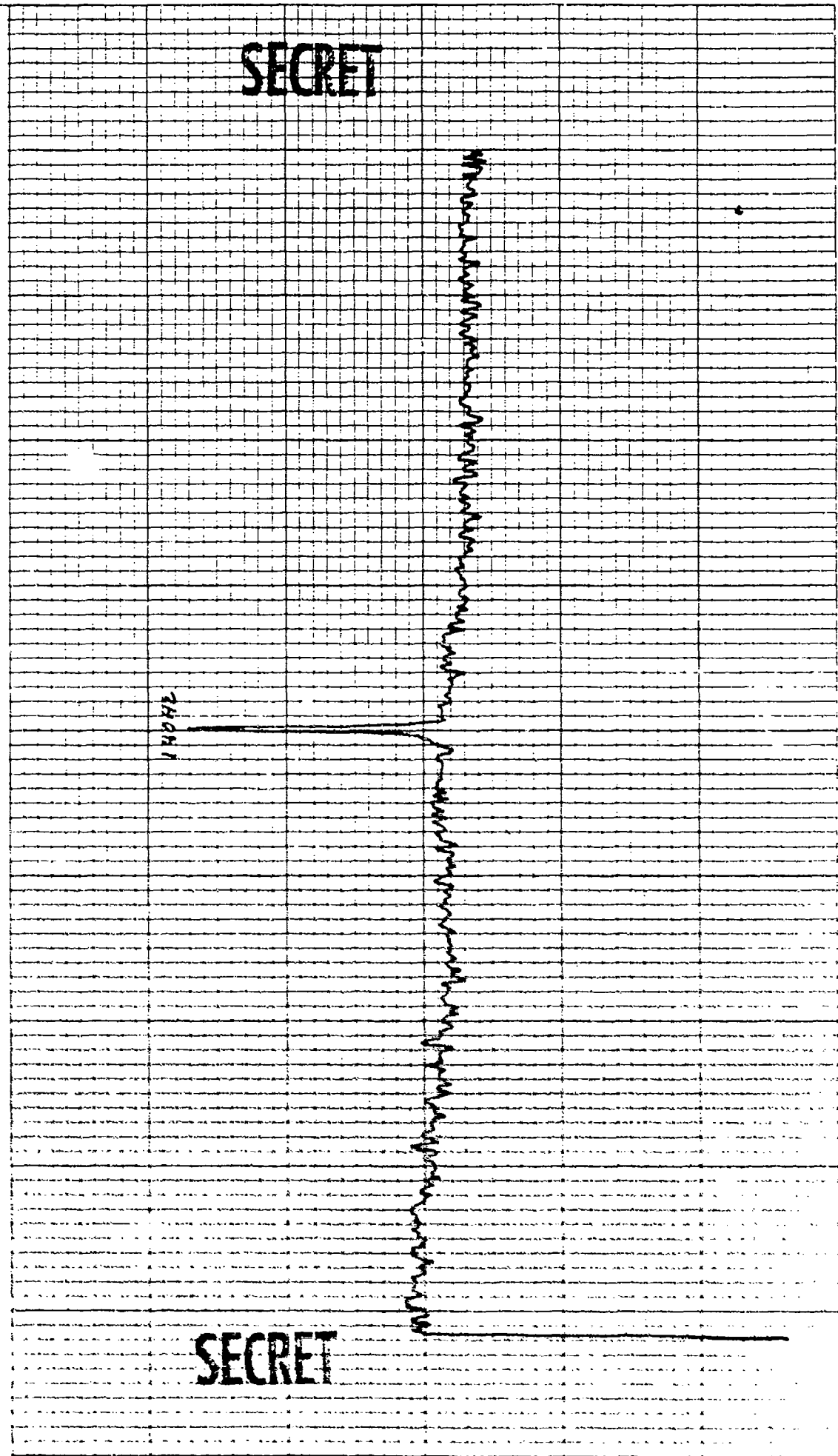
46 0703

CONTROL: 1140 - 32 (DP12)
BEAMFORMED SPECTRUM(ELEMENTS)
EXERCISE: BEARING STAKE
CENTER FREQ: 140 HZ
32 ELEMENTS

DATE OF ANALYSIS: 1-26-77
DATE/TIME: 7-12-77 - 1148 Z
ANALYSIS BANDWIDTH: 1/10HZ
+50 DEG. AZ STEERING

REEL: 424
INTEGRATION TIME 320 SECS
FILTER WTG: HANNING

INDE X1995
ATTN: 1/1 DB



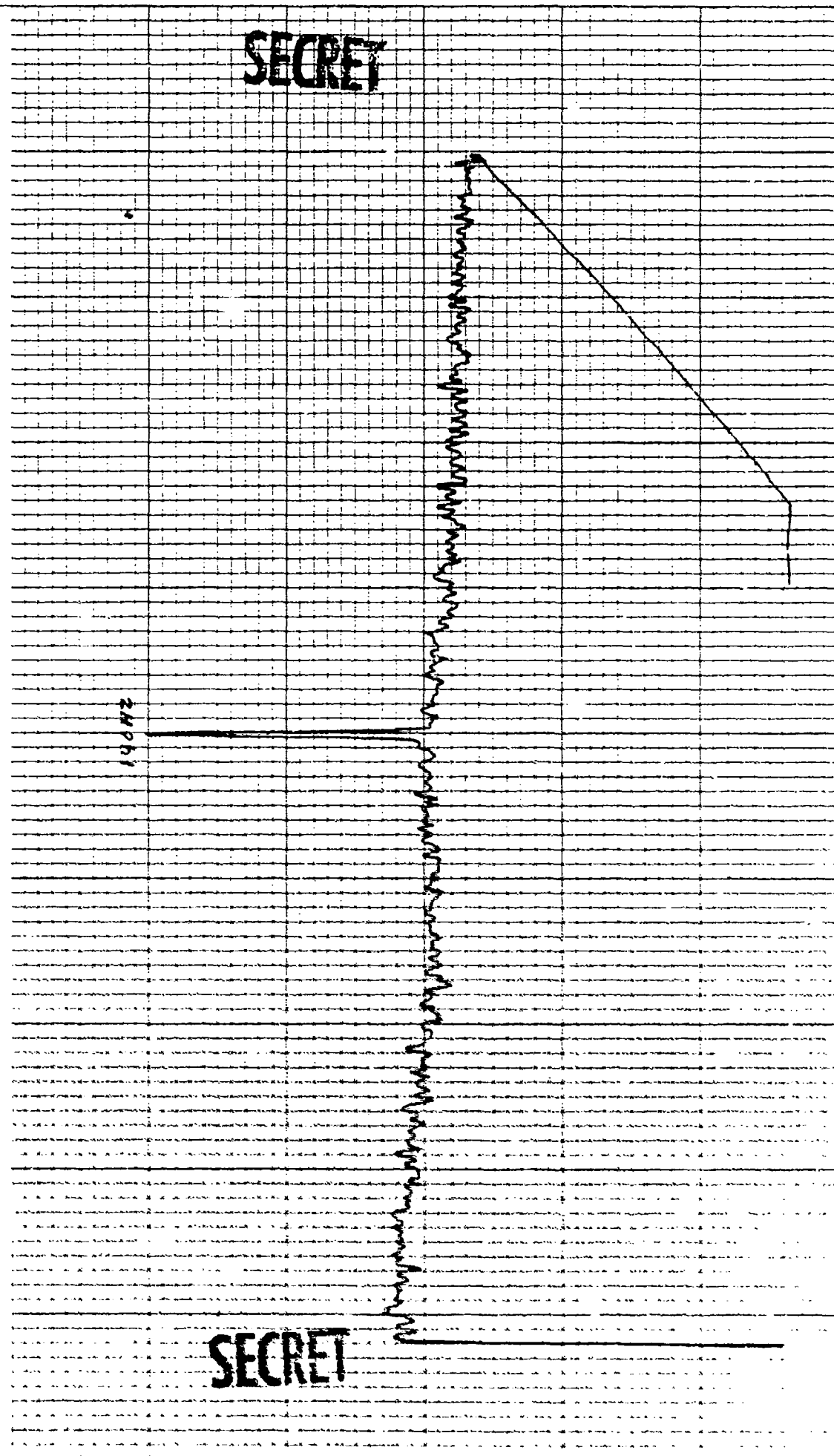
10 X IS TO THE INCH. 1/2 DO NOTES
REUSE REUSE CO. WASH. D.C.

46 0703

CONTR: 1140 - 72 (DP12)
BEAMFORMED SPECTRUM(ELEMENTS
EXERCISE: BEARING STAKE
CENTER FREQ: 140 HZ
32 ELEMENTS

DATE OF ANALYSIS: - - -
1-26-88-34
DATE/TIME: 3-26-77-1140 Z
ANALYSIS BANDWIDTH: 1/10HZ
452 DEG. AZ STEERING

REEL: H2Y INDE X 1983
INTEGRATION TIME 320 SECS
ATTN: -10 DB
FILTER WTG: HANNING



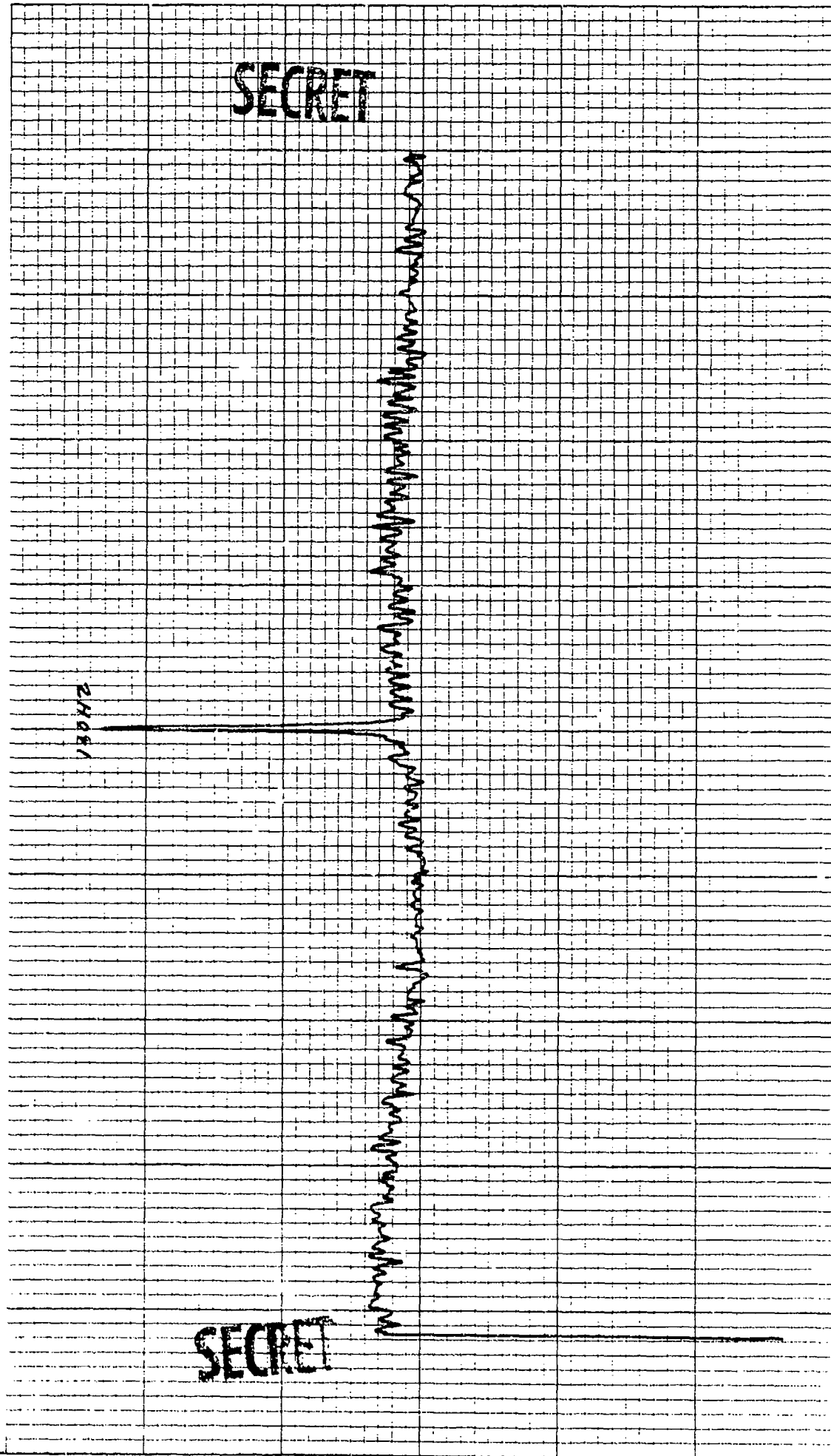
REEL: M24 INDEX X/885
INTEGRATION TIME 320 SECS ATTEN: -10 DB
FILTER WGT: HANNING

SECRET

SECRET

Wangjiahe is a small village in the mountainous area of the Yangtze River. It is a typical mountain village with a long history. The village is located in the mountainous area of the Yangtze River, and it is a typical mountain village with a long history. The village is located in the mountainous area of the Yangtze River, and it is a typical mountain village with a long history.

CONTROL: 1140 - 32 (DP12) DATE OF ANALYSIS: - - - - - INDE X1185
BEAMFORMED SPECTRUM (ELEMENTS) 1-26 08-34)
EXERCISE: BEARING STAKE DATE/TIME: 3-16-77 - 1140 Z INTEGRATION TIME 320 SECS ATTN: -/0 DB
CENTER FREQ: 140 HZ ANALYSIS BANDWIDTH: 1/10 HZ FILTER WTG: HANNING
32 ELEMENTS +56 DEG. AZ SFEERING



SECRET

K. S. 10 X 10 TO THE INCH • 7 X 10 INCHES
KEUFFEL & ESSER CO. MADE IN U.S.A.

46 0703

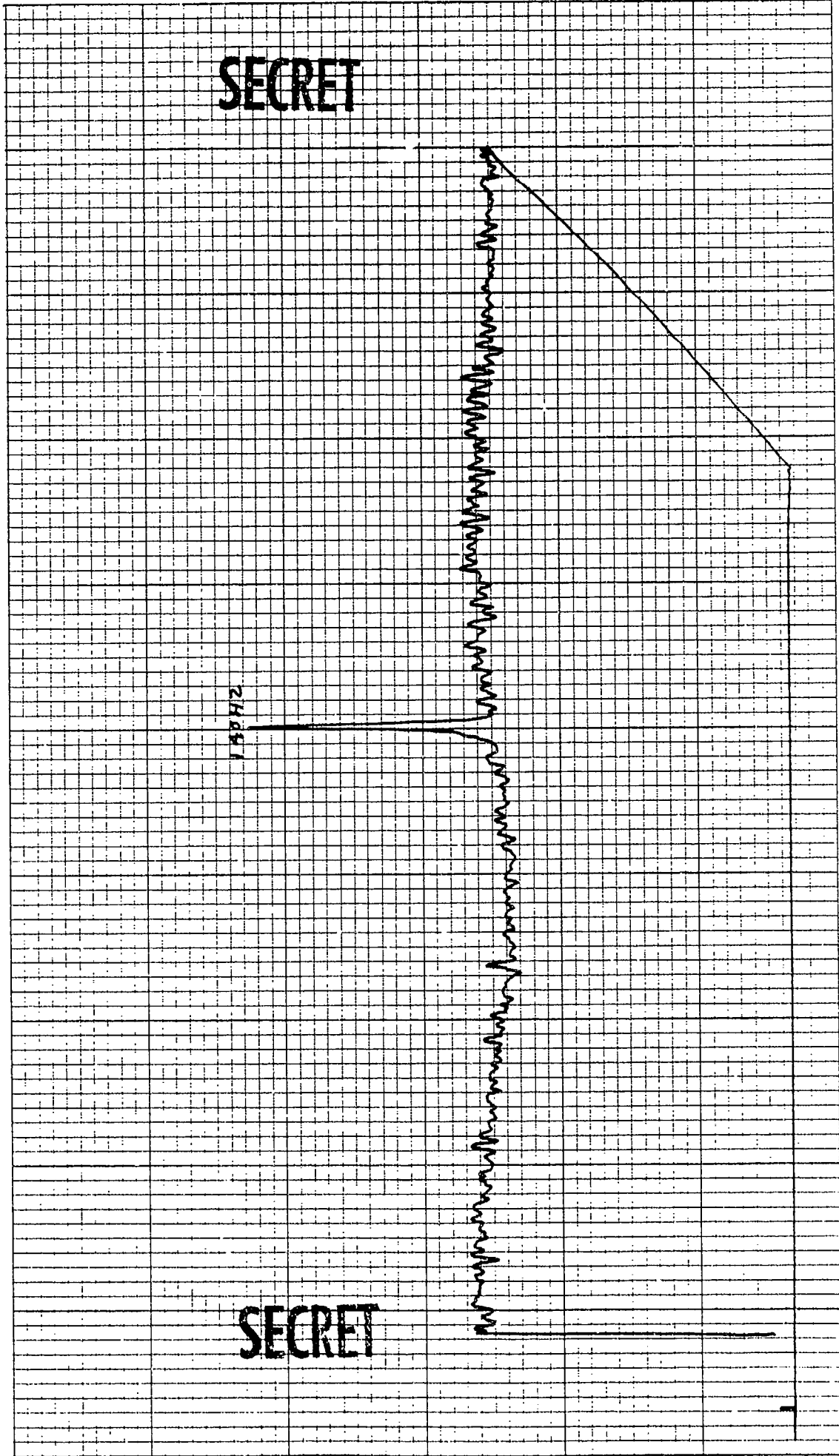
CONTROL: 1148 - 32 (DP12)
BEAMFORMED SPECTRUM(ELEMENTS
EXERCISE: BEARING STAKE
CENTER FREQ: 140 HZ
32 ELEMENTS

DATE OF ANALYSIS: 1-26-77
DATE/TIME: 3-6-77-1148 Z
ANALYSIS BANDWIDTH: 1/10HZ
+58 DEG. AZ STEERING

REEL: 124
INTEGRATION TIME 320 SECS
FILTER WTG: HANNING
INDE X/825
ATTEN: -10 DB

SECRET

SECRET



K-2 10 X 10 TO THE INCH • 2 X 10 INCHES
KEUFFEL & ESSER CO. MADE IN U.S.A.

46 0703

CONTROL: 1140 - 32 (2012)
BEAMFORMED SPECTRUM (ELEMENTS)
EXERCISE: BEARING STAKE
CENTER FREQ: 140 HZ
32 ELEMENTS

DATE OF ANALYSIS: - - - -
1-26-77
DATE/TIME: 3-16-77 - 1148 Z
ANALYSIS BANDWIDTH: 1/10 HZ
+ 59 DEG. AZ STEERING

REEL: 124
INTEGRATION TIME 320 SECS
FILTER

INDE X 1985
ATTN: -18 DB
WTG: HANNING

SECRET

140 HZ

SECRET



KΣ 10 X 10 TO THE INCH • 7 X 10 INCHES
KEUFFEL & ESSER CO. MADE IN U.S.A.

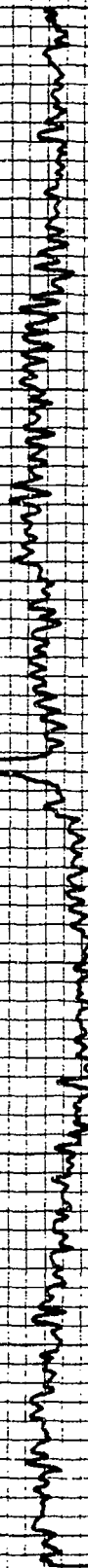
46 0703

CONTROL: 1148 - 32 (DP12) DATE OF ANALYSIS: 1-26-77 REEL: M24 INDE X/995
BEAMFORMED SPECTRUM(ELEMENTS) 20-34
EXERCISE: BEARING STAKE DATE/TIME: 3-16-77-1148 Z INTEGRATION TIME 320 SECS ATTEN: -18 DB
CENTER FREQ: 140 HZ ANALYSIS BANDWIDTH: 1/10HZ FILTER WTG: HANNING
32 ELEMENTS +60 DEG. AZ STEERING

SECRET

140 HZ

SECRET



KSE 10 X 10 TO THE INCH • 7 X 10 INCHES
KEUFFEL & ESSER CO. MADE IN U.S.A.

46 0703

CONTROL: 1148 - 32 (Q012)
BEAMFORMED SPECTRUM(ELEMENTS
EXERCISE: BEARING STAKE
CENTER FREQ: 140 HZ
32 ELEMENTS

DATE OF ANALYSIS: - - -
1-26-77 28-34)
DATE/TIME: 3-16-77 - 1148 Z
ANALYSIS BANDWIDTH: 1/10HZ
+ 61 DEG. AZ STEERING

REEL: M24
INTEGRATION TIME 320 SECS
FILTER

INDE X/985
ATTEN: -18 DB
WTG: HANNING

SECRET

1148HZ

SECRET

K.E 10 X 10 TO THE INCH • 7 X 10 INCHES
KEUFFEL & ESSER CO. MADE IN U.S.A.

46 0703

B774

CONTROL: 1140 - 32 (0912)
BEAMFORMED SPECTRUM (ELEMENTS
EXERCISE: BEARING STAKE
CENTER FREQ: 140 HZ
32 ELEMENTS

DATE OF ANALYSIS: 1-26 200-34)
DATE/TIME: 3-16-77 - 1140 Z
ANALYSIS BANDWIDTH: 1/10 HZ
+ 0.5 DEG. AZ STEERING

REEL: N24

INDE X/905

INTEGRATION TIME 320 SECS
FILTER

ATTN: -18 DB
WTG: HANNING

SECRET

SECRET

1400 HZ



KOE 10 X 10 TO THE INCH • 7 X 10 INCHES
KEUFFEL & ESSER CO. MADE IN U.S.A.

46 0703

CONTROL: 1148 - 32 (D12)
BEAMFORMED SPECTRUM (ELEMENTS)
EXERCISE: BEARING STAKE
CENTER FREQ: 140 HZ
32 ELEMENTS

DATE OF ANALYSIS: 1-26-77
DATE/TIME: 3-16-77 - 1148 Z
ANALYSIS BANDWIDTH: 1/10 HZ
+162 DEG. AZ STEERING

REEL: H24
INDE X/1166
INTEGRATION TIME 320 SECS
ATTEN: -18 DB
FILTER WTG: HANNING

SECRET

140 HZ

SECRET

K-2 10 X 10 TO THE INCH • 7 X 10 INCHES
KEUFFEL & ESSER CO. MADE IN U.S.A.

46 0703

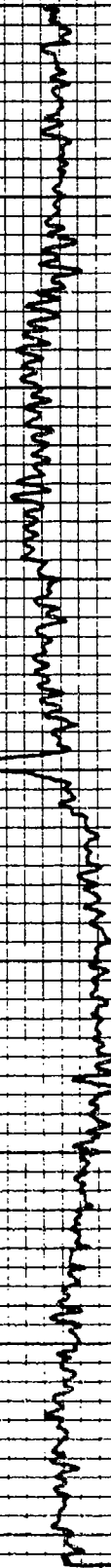
CONTROL: 1148 - 32 (QPI2) DATE OF ANALYSIS: 1-26-77 21-34) REEL: M24 INDE X/998
BEAMFORMED SPECTRUM(ELEMENTS) DATE/TIME: 7-16-77 - 1148 Z INTEGRATION TIME 320 SECS ATTEN: 10 DB
EXERCISE: BEARING STAKE ANALYSIS BANDWIDTH: 1/10HZ FILTER WTG: HANNING
CENTER FREQ: 140 HZ +63 DEG. AZ STEERING

32 ELEMENTS

SECRET

SECRET

140HZ



MSE 10 X 10 TO THE INCH • 7 X 10 INCHES
KEUFFEL & ESSER CO. MADE IN U.S.A.

46 0703

100-2105

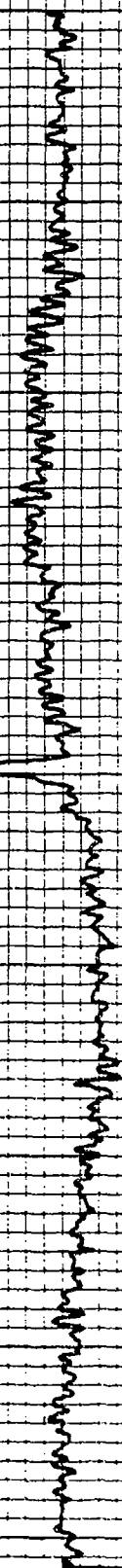
CONTROL: 1148 - 32 (DEIA) DATE OF ANALYSIS: 1-26-77-1148 Z REEL: M24 INDE X1995
BEAMFORMED SPECTRUM(ELEMENTS) EXERCISE: BEARING STAKE ANALYSIS BANDWIDTH: 1/10HZ
CENTER FREQ: 140 HZ +64 DEG. AZ STEERING
32 ELEMENTS

INTEGRATION TIME 320 SECS
ATTEN: 78 DB
WTG: HANNING
FILTER

SECRET

SECRET

1140 HZ



K05 10 X 10 TO THE INCH • 7 X 10 INCHES
KEUFFEL & ESSER CO. MADE IN U.S.A.

46 0703

CONTROL: 1140 - 32 (DP/2) DATE OF ANALYSIS: - - - REEL: N24 INDE X/935
BEAMFORMED SPECTRUM(ELEMENTS) 1-26/28-34)
EXERCISE: BEARING STAKE DATE/TIME: 3-16-77 - 1140 Z INTEGRATION TIME 320 SECS ATTN: -/0 DB
CENTER FREQ: 140 HZ ANALYSIS BANDWIDTH: 1/10 HZ FILTER WTG: HANNING
32 ELEMENTS +66 DEG. AZ STEERING

SECRET

SECRET

140 HZ



KOE 10 X 10 TO THE INCHES X 10 INCHES
KEUFFEL & ESSER CO. MADE IN U.S.A.

46 0703

CONTROL: 1148 - 72 (DP12)
BEAMFORMED SPECTRUM (ELEMENTS)
EXERCISE: BEARING STAKE
CENTER FREQ: 140 HZ
72 ELEMENTS

DATE OF ANALYSIS: -- -- --
1-26-77
DATE/TIME: 3:26:77 -1148 Z
ANALYSIS BANDWIDTH: 1/10 HZ
+68 DEG. AZ STEERING

REEL: M24
INTEGRATION TIME 320 SECS
INDE X1995
ATTEN: -18 DB
WTG: HANNING
FILTER

SECRET

SECRET

18481



16E 10 X 10 TO THE INCH 1/2 X 10 INCHES
KEUPPEL & ESSER CO. MADE IN U.S.A.

46 0703

CONTROL: 1148 - 72 (DP12) DATE OF ANALYSIS: - - - -
BEAMFORMED SPECTRUM (ELEMENTS) 1-266 28-34
EXERCISE: BEARING STAKE DATE/TIME: 3-16-77 - 1148 Z
CENTER FREQ: 148 HZ ANALYSIS BANDWIDTH: 1/10 HZ
72 ELEMENTS 70 DEG. AZ STEERING

REEL: M24 INDE X/1985
INTEGRATION TIME 320 SECS ATTN: -10 DB
FILTER WTC: HANNING

SECRET

SECRET



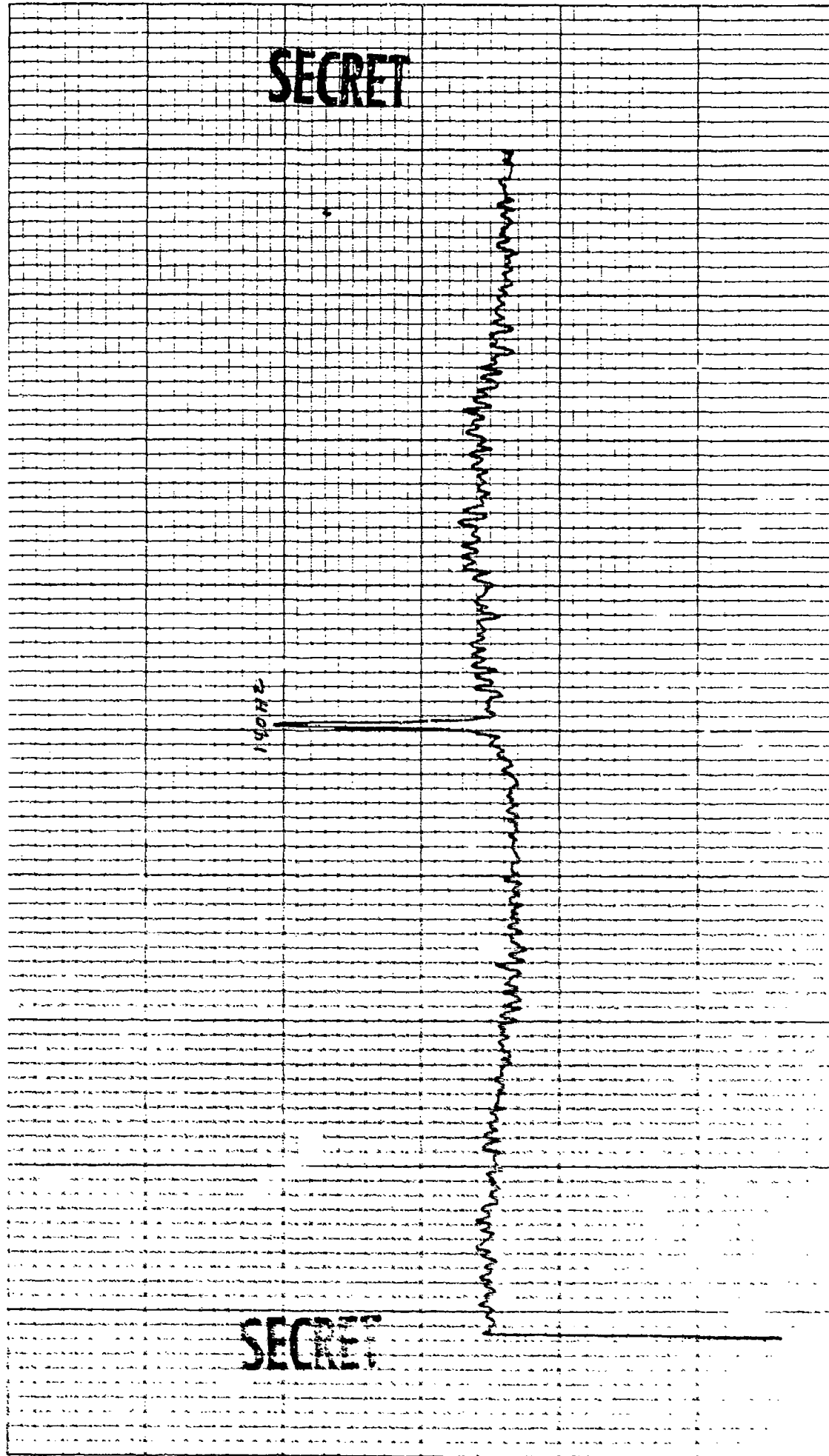
KOE 10 X 10 TO THE INCH 1/2 X 10 INCHES
WELFEL & ENGINE CO. MADE IN U.S.A.

46 0703

CONTROL: 1140 - 32 (DP12)
BEAMFORMED SPECTRUM (ELEMENTS)
EXERCISE: BEARING STAKE
CENTER FREQ: 140 HZ
32 ELEMENTS

DATE OF ANALYSIS: 1-26-77
DATE/TIME: 7-16-77 - 1148 Z
ANALYSIS BANDWIDTH: 1/10 HZ
+72 DEG. AZ STEERING

REEL: 424
INDE X/1995
INTEGRATION TIME 320 SECS
ATTEN: -18 DB
FILTER WTG: HANNING



46 0703

CONTROL: 1148 - 32 (DPIA)
BEAMFORMED SPECTRUM (ELEMENTS)
EXERCISE: BEARING STAKE
CENTER FREQ: 140 HZ
32 ELEMENTS

DATE OF ANALYSIS: 1-26-77
DATE/TIME: 3-16-77 - 1148 Z
ANALYSIS BANDWIDTH: 1/10 HZ
+ 74 DEG. AZ STEERING

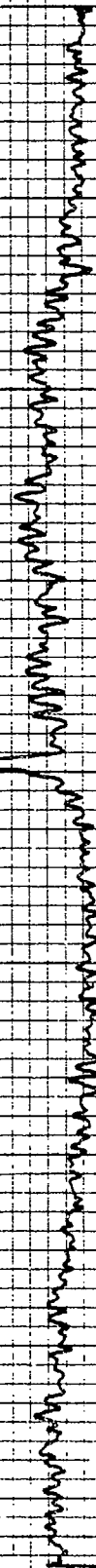
REEL: 1144
INTEGRATION TIME 320 SECS
FILTER

INDE X/1145
ATTN: -11 DB
WTG: HANNING

SECRET

140 HZ

SECRET



KOE 10 X 10 TO THE INCH • 7 X 10 INCHES
KEUFFEL & ESSER CO. MADE IN U.S.A.

46 0703

35

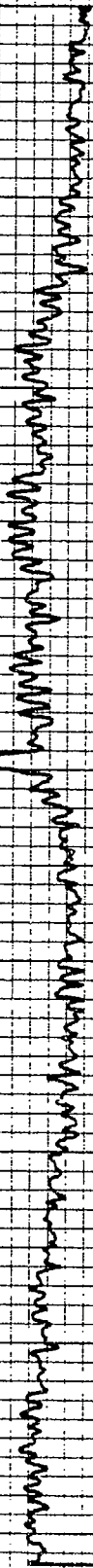
CONTROL: 1148 - 32 (Data) REEL: 124 INDE X 1995
BEAMFORMED SPECTRUM (ELEMENTS) DATE OF ANALYSIS: - - -
EXERCISE: BEARING STAKE DATE/TIME: 3-26-77 - 1148 Z
CENTER FREQ: 140 HZ ANALYSIS BANDWIDTH: 1/10 HZ
32- ELEMENTS +76 DEG. AZ STEERING

INTEGRATION TIME 320 SECS
ATTEN: -18 DB
FILTER
WTG: HANNING

SECRET

SECRET

140 HZ



K_E 10 X 10 TO THE INCH • 7 X 10 INCHES
KEUFFEL & ESSER CO. MADE IN U.S.A.

46 0703

CONTROL: 1148 - 32 (DP12)
BEAMFORMED SPECTRUM (ELEMENTS)
EXERCISE: BEARING STAKE
CENTER FREQ: 140 HZ
32 ELEMENTS

DATE OF ANALYSIS: 1-26-77
DATE/TIME: 3-16-77-1148Z
ANALYSIS BANDWIDTH: 1/10HZ
+ 78 DEG. AZ STEERING

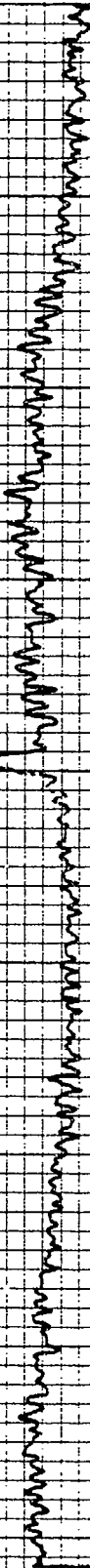
REEL: 1124
INTEGRATION TIME 320 SECS
FILTER

INDE X/995
ATTN: -10 DB
WTG: HANNING

SECRET

140 HZ

SECRET



K-2 10 X 10 TO THE INCH • 7 X 10 INCHES
KEUFFEL & ESSER CO. MADE IN U.S.A.

46 0703

CONTROL: 1148 - 32 (0012)
BEAMFORMED SPECTRUM(ELEMENTS
EXERCISE: BEARING STAKE
CENTER FREQ: 970 HZ
32 ELEMENTS

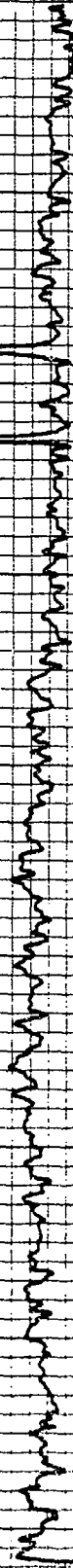
DATE OF ANALYSIS: 1-26-72 28-34)
DATE/TIME: 3-16-72 -1148 Z
ANALYSIS BANDWIDTH: 1/10HZ
+48 DEG. AZ STEERING

REEL: M34 INDE X/995
INTEGRATION TIME 320 SECS
ATTEN: -10 DB
FILTER WTG: HANNING

SECRET

SECRET

1148HZ



K02 10 X 10 TO THE INCH • 7 X 10 INCHES
KEUFFEL & ESSER CO. MADE IN U.S.A.

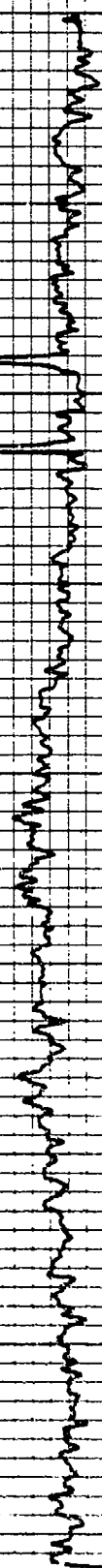
46 0703

CONTROL: 1148 - 22 (DPIA) DATE OF ANALYSIS: - - - - - REEL: 124 INDE X 1905
BEAMFORMED SPECTRUM (ELEMENTS) 1-26 4 29-34)
EXERCISE: BEARING STAKE DATE/TIME: 3-16-77 - 1140 Z INTEGRATION TIME 320 SECS ATTN: -18DB
CENTER FREQ: 270 HZ ANALYSIS BANDWIDTH: 1/10 HZ FILTER WTG: HANNING
92 ELEMENTS +50 DEG. AZ STEERING

SECRET

SECRET

210 HZ

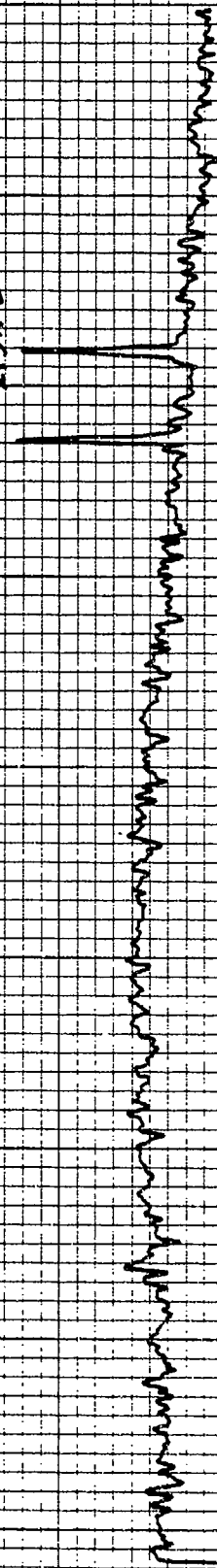


CONTROL: 1148 - 32 (D012) DATE OF ANALYSIS: 1-26-34 REEL: 424 INDE X 1995
BEAMFORMED SPECTRUM(ELEMENTS) DATE/TIME: 3-16-77 - 1148 Z INTEGRATION TIME 320 SECS ATTN: -10 DB
EXERCISE: BEARING STAKE ANALYSIS BANDWIDTH: 1/10HZ FILTER WTG: HANNING
CENTER FREQ: 270 HZ +52 DEG. AZ STEERING

SECRET

SECRET

28542



K-2 10 X 10 TO THE INCH • 7 X 10 INCHES
KEUFFEL & ESSER CO. MADE IN U.S.A.

46 0703

CONTROL: 1148 - 32 (2012) DATE OF ANALYSIS: 1-26-77 - 1148 Z REEL: H24 INDE X/1985
BEAMFORMED SPECTRUM(ELEMENTS) ANALYSIS BANDWIDTH: 1/10HZ
EXERCISE: BEARING STAKE +54 DEG. AZ STEERING
CENTER FREQ: 270 HZ
32 ELEMENTS

INTEGRATION TIME 320 SECS
ATTEN: -18 DB
FILTER WTG: HANNING

SECRET

SECRET

200412

Handwritten scribbles and lines across the grid.

CONTROL: 1148 - 32 (DP12) DATE OF ANALYSIS: - - - -
BEAMFORMED SPECTRUM (ELEMENTS) 1-26828-34)
EXERCISE: BEARING STAKE DATE/TIME: 3-16-77 - 1148 Z
CENTER FREQ: 270 HZ ANALYSIS BANDWIDTH: 1/10 HZ
32 ELEMENTS +56 DEG. AZ STEERING

REEL: M24

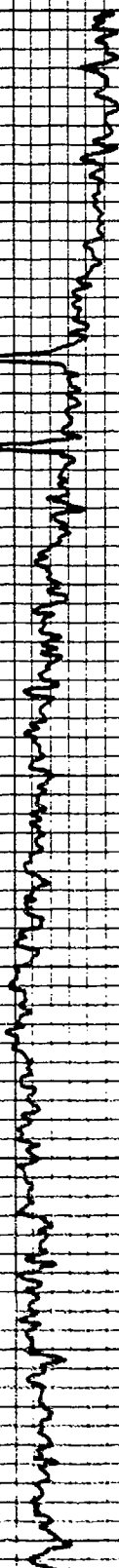
INDE X 1995

INTEGRATION TIME 320 SECS
FILTER WTG: HANNING

SECRET

SECRET

280000



10 X 10 TO THE INCHES
K&E GRAPH & PAPER CO. MADE IN U.S.A.

46 0703

CONTROL: 1148 - 32 (201A)
BEAMFORMED SPECTRUM(ELEMENTS)
EXERCISE: BEARING STAKE
CENTER FREQ: 270 HZ
32 ELEMENTS

DATE OF ANALYSIS: 1-26-68 08-34)
DATE/TIME: 3-7-67 - 1148 Z
ANALYSIS BANDWIDTH: 1/10HZ
+50 DEC. AZ STEERING

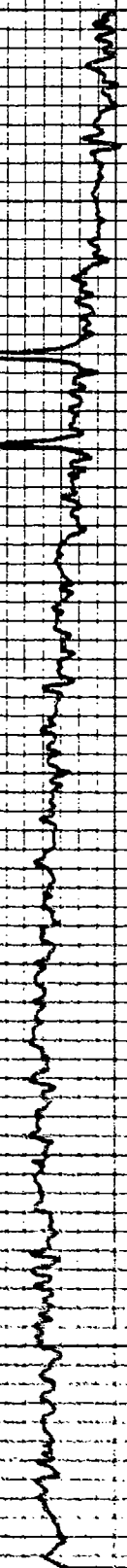
REEL: 424
INTEGRATION TIME 320 SECS
FILTER
WTG: HANNING

INDE X1985
ATTN: -10 DB

SECRET

SECRET

20002



K-E 10 X 10 TO THE INCH • 7 X 10 INCHES
KEUFFEL & ESSER CO. MADE IN U.S.A.

46 0703

CONTROL: 1140 - 72 (DPIA)
BEAMFORMED SPECTRUM (ELEMENTS)
EXERCISE: BEARING STAKE
CENTER FREQ: 270 HZ
32 ELEMENTS

DATE OF ANALYSIS: - - -
1-26-77 20-34
DATE/TIME: 3-6-77 - 1:40 Z
ANALYSIS BANDWIDTH: 1/10 HZ
+ 59 DEG. AZ STEERING

REEL: N94

INDE X 1905

INTEGRATION TIME 320 SECS

ATTEN: -10 DB

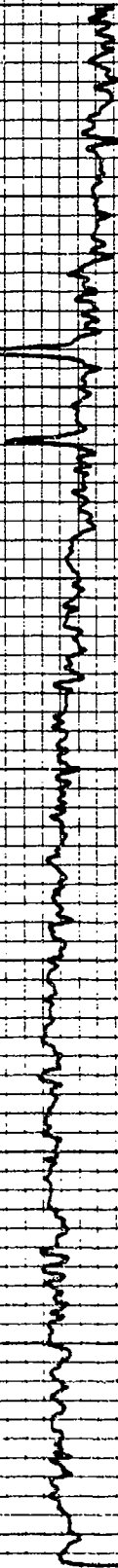
FILTER

WTG: HANNING

SECRET

SECRET

2000



K.E. 10 X 10 TO THE INCH • 7 X 10 INCHES
KEUFFEL & ESSER CO. MADE IN U.S.A.

46 0703

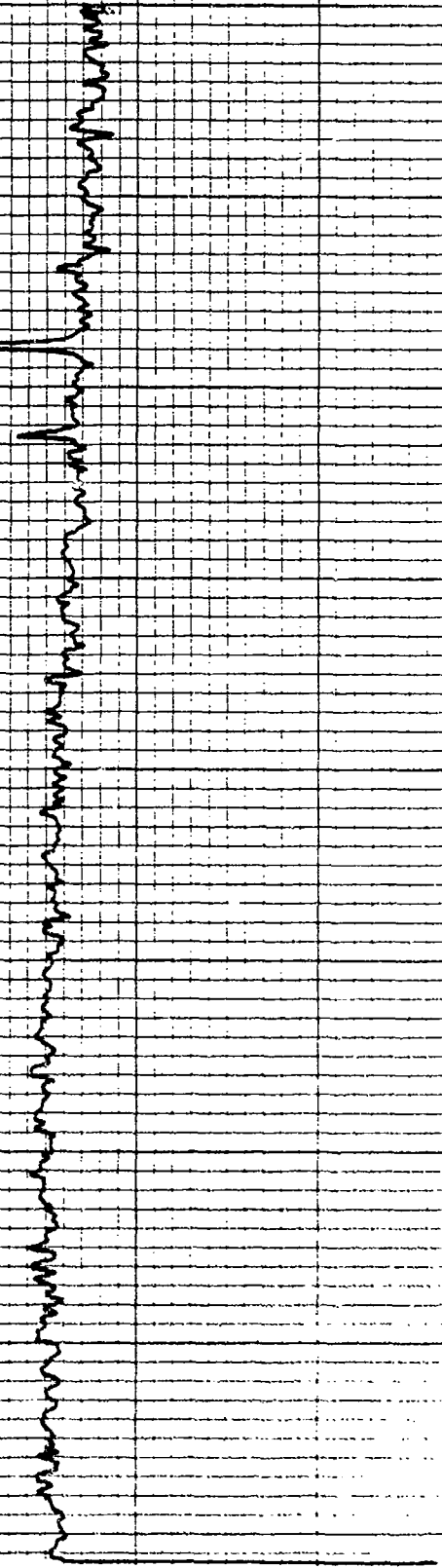
CONTROL: 1148 - 32 (2012) REEL: 124 INDE X/1915
BEAMFORMED SPECTRUM(ELEMENTS) 1-26 28-34
EXERCISE: BEARING STAKE DATE/TIME: 3-16-77 - 1148 Z
CENTER FREQ: 270 HZ ANALYSIS BANDWIDTH: 1/10HZ
32 ELEMENTS +60 DEG. AZ STEERING

INTEGRATION TIME 320 SECS
ATTEN: -10 DB
FILTER
WTG: HANNING

SECRET

SECRET

270 HZ



100E 10 X 10 TO THE INCHES 1 X 10 INCHES
WEINER ASSOCIATES CO. 100E 100E

46 0703

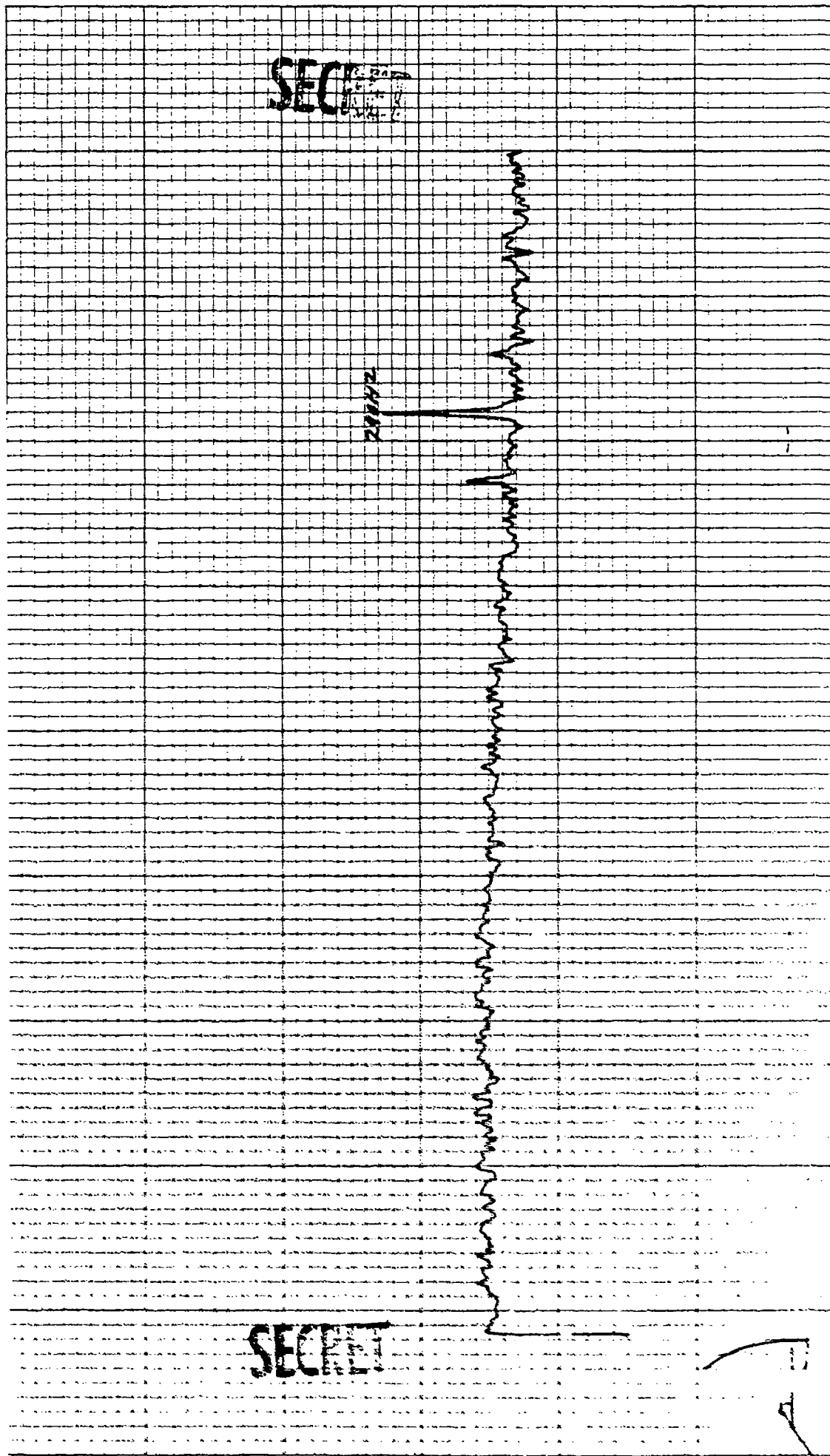
CONTROL: 1140 - 32 (2012)
BEAMFORMED SPECTRUM(ELEMENTS
EXERCISE: BEARING STAKE
CENTER FREQ: 190 HZ
32 ELEMENTS

DATE OF ANALYSIS: 1-26-77
DATE/TIME: 3-6-77 - 1/48 Z
ANALYSIS BANDWIDTH: 1/10HZ
+ 6/ DEG. AZ STEERING

REEL: N24
INTEGRATION TIME 320 SECS
FILTER WTG: HANNING

INDE X/1995

ATTN: 10 DB
WTG: HANNING



10 X 10 TO THE INCHES
PRINTED & PUBLISHED BY THE
NAVY DEPARTMENT

46 0703

1-2-42

CONTROL: 1148 - 32 (0012)
BEAMFORMED SPECTRUM (ELEMENTS
EXERCISE: BEARING STAKE
CENTER FREQ: 270 HZ
32 ELEMENTS

DATE OF ANALYSIS: 1-26-34
DATE/TIME: 3-16-77 - 1148 Z
ANALYSIS BANDWIDTH: 1/10 HZ
46.5 DEG. AZ STEERING

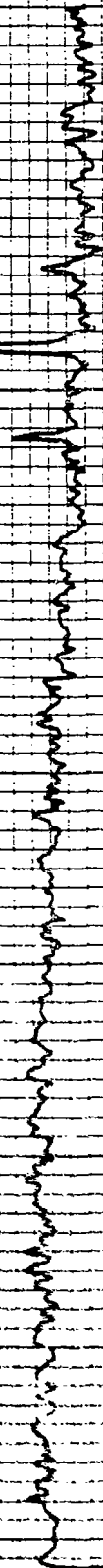
REEL: H-4
INTEGRATION TIME 320 SECS
FILTER

INDE X/198
ATTN: 70 DB
WTG: HANNING

SECRET

SECRET

270 HZ



10 X 10 TO THE INCHES
NEUTRAL & POWER CO. MADE IN U.S.A.

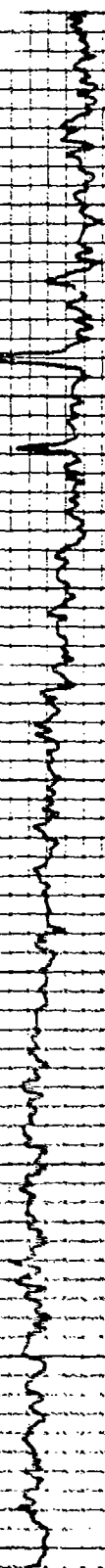
46 0703

CONTROL: 1140 - 32 (D012) DATE OF ANALYSIS: 1-26-77 20-34 REEL: M20 INDE X/995
BEAMFORMED SPECTRUM(ELEMENTS) DATE/TIME: 7-16-77 - 1140 Z INTEGRATION TIME 320 SECS ATTEN: -18 DB
EXERCISE: BEARING STAKE ANALYSIS BANDWIDTH: 1/10HZ FILTER WTC: HANNING
CENTER FREQ: 270 HZ
32 ELEMENTS 462 DEG. AZ STEERING

SECRET

SECRET

20000



CONTROL: 1140 - 32 (DP1A)
BEAMFORMED SPECTRUM(ELEMENTS)
EXERCISE: BEARING STAKE
CENTER FREQ: 270 HZ
32 ELEMENTS

DATE OF ANALYSIS: 1-26-89-34
DATE/TIME: 3-12-87 - 1124 Z
ANALYSIS BANDWIDTH: 1/10HZ
463 DEG. AZ STEERING

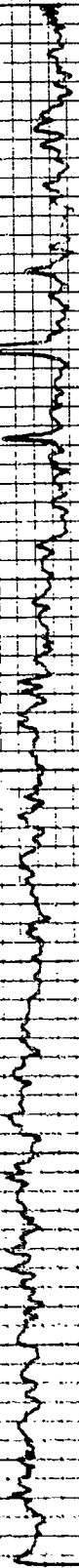
REEL: M24
INTEGRATION TIME 320 SECS
FILTER

INDE X1995
ATTN: 10 DB
WTG: HANNING

SECRET

SECRET

230 HZ



10 X 10 TO THE INCHES
KEUFFEL & ESSER CO. MADE IN U.S.A.

46 0703

CONTROL: 1148 - 32 (DP12)
BEAMFORMED SPECTRUM (ELEMENTS)
EXERCISE: BEARING STAKE
CENTER FREQ: 270 HZ
32 ELEMENTS

DATE OF ANALYSIS: - - -
1-25-89-34
DATE/TIME: 3-16-77 - 1148 Z
ANALYSIS BANDWIDTH: 1/10 HZ
+64 DEG. AZ STEERING

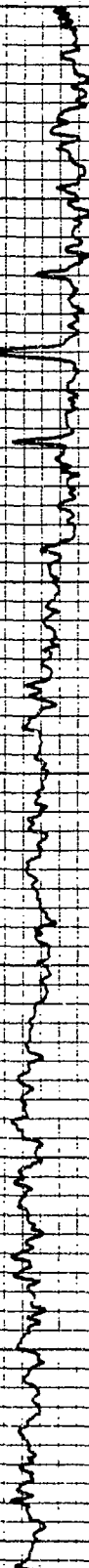
REEL: M24
INTEGRATION TIME 320 SECS
FILTER

INDE X/1995
ATTEN: -10 DB
WTG: HANNING

SECRET

SECRET

2000



K-2 10 X 10 TO THE INCH • 7 X 10 INCHES
KEUFFEL & ESSER CO. MADE IN U.S.A.

46 0703

CONTROL: 1140 - 32 (0912)
BEAMFORMED SPECTRUM (ELEMENTS)
EXERCISE: BEARING STAKE
CENTER FREQ: 270 HZ
32 ELEMENTS

DATE OF ANALYSIS: 1-26 1974
DATE/TIME: 3/6-27-1140 Z
ANALYSIS BANDWIDTH: 1/10 HZ
+ 66 DEG. AZ STEERING

REEL: 124
INTEGRATION TIME 320 SECS
FILTER
WTG: HANNING

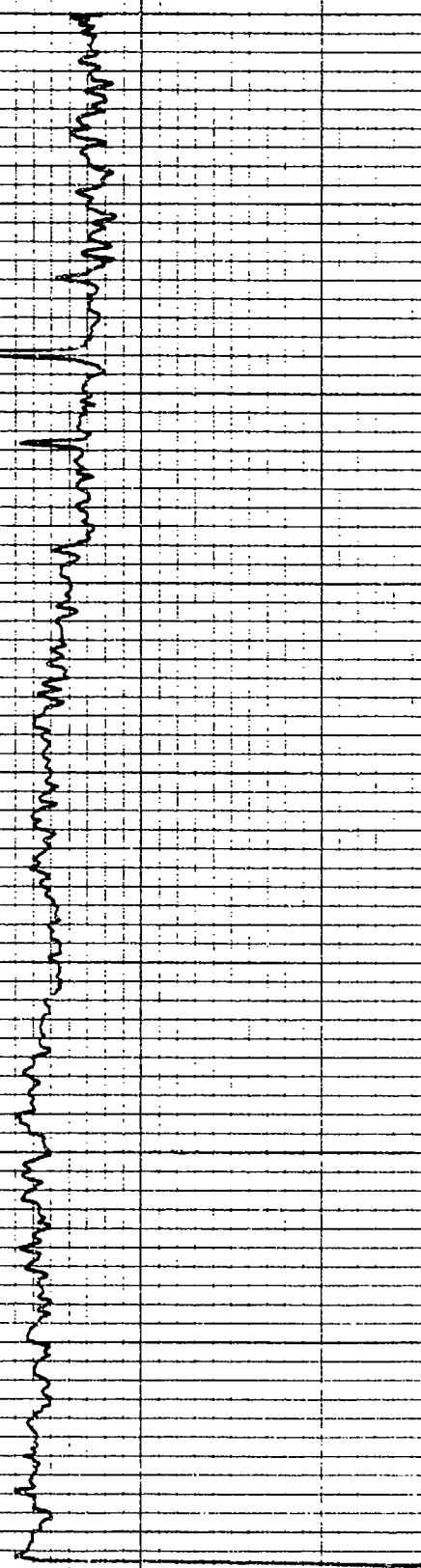
INDE X/995

ATTN: -10 DB
WTG: HANNING

SECRET

SECRET

29000



10 X 10 TO THE INCH • 7 X 10 INCHES
KEUFFEL & ESSER CO. MADE IN U.S.A.

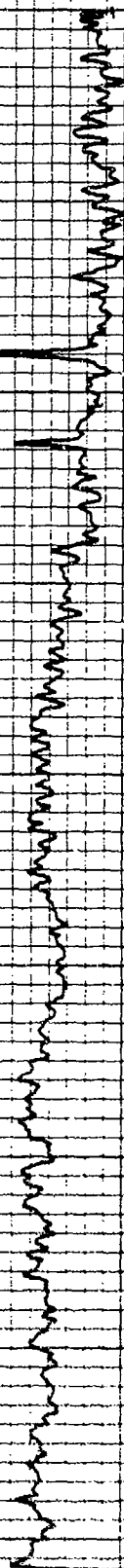
46 0703

CONTROL: 1140 - 32 (DP12) DATE OF ANALYSIS: 1-26-88-34) REEL: H24 INDE X1115
BEAMFORMED SPECTRUM (ELEMENTS) DATE/TIME: 3-6-77-1148 Z INTEGRATION TIME 320 SECS ATTN: -10 DB
EXERCISE: BEARING STAKE ANALYSIS BANDWIDTH: 1/10HZ FILTER WTC: HANNING
CENTER FREQ: 270 HZ + 60 DEG. AZ STEERING

SECRET

SECRET

230712



10 X 10 TO THE INCHES
KOE KUPPER AESSIN CO. NEW YORK

46 0703

CONTROL: 1140 - J2 (DE 12)
BEAMFORMED SPECTRUM(ELEMENTS)
EXERCISE: BEARING STAKE
CENTER FREQ: 270 HZ
32 ELEMENTS

DATE OF ANALYSIS: 1-26-77-34
DATE/TIME: 3-16-77-1148 Z
ANALYSIS BANDWIDTH: 1/10HZ
+70 DEG. AZ STEERING

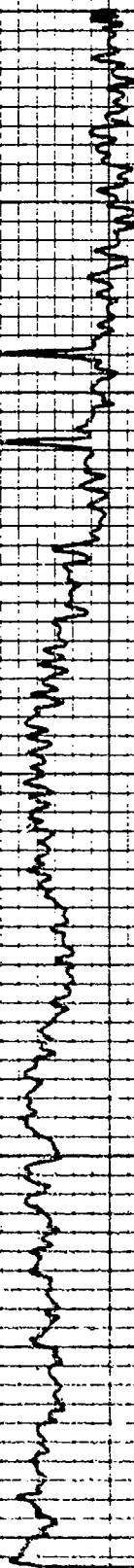
REEL: 1124
INTEGRATION TIME 320 SECS
FILTER
WTG: HANNING

INDE X/1985
ATTN: 70 DB

SECRET

SECRET

270 HZ



K-8 10 X 10 TO THE INCH • 7 X 10 INCHFS
KEUFFEL & ESSER CO. MADE IN U.S.A.

46 0703

CONTROL: 1148 - 32 (DP12)
BEAMFORMED SPECTRUM (ELEMENTS
EXERCISE: BEAPING STAKE
CENTER FREQ: 270 HZ
32 ELEMENTS

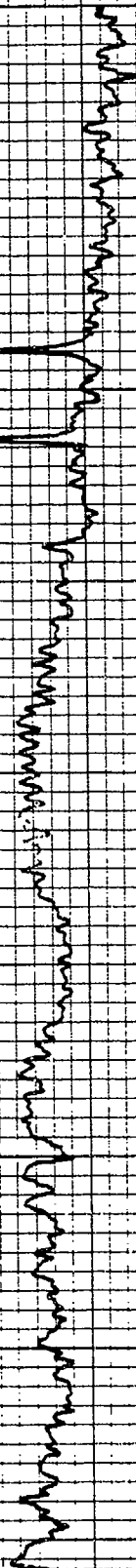
DATE OF ANALYSIS: - - -
1-26-77-34
DATE/TIME: 3-16-77-1148 Z
ANALYSIS BANDWIDTH: 1/10 HZ
472 DEG. AZ STEERING

REEL: 424 INDE X/1905
INTEGRATION TIME 320 SECS
ATTN: -18 DB
FILTER WTG: HANNING

SECRET

SECRET

280.72



KSE 10 X 10 TO THE INCH • 7 X 10 INCHES
KEUFFEL & ESSER CO. MADE IN U.S.A.

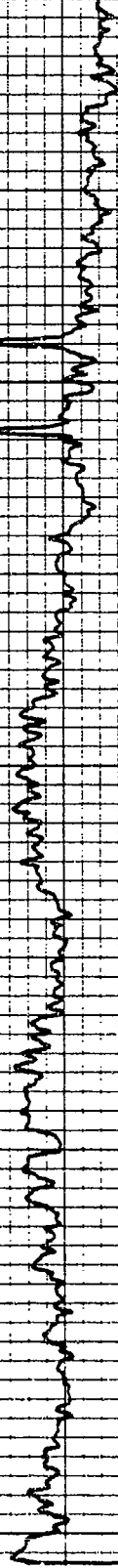
46 0703

CONTROL: 1148 - 32 (DB-12) DATE OF ANALYSIS: 1-26-77 REEL: 424 INDE X/1995
BEAMFORMED SPECTRUM(ELEMENTS) DATE/TIME: 3-6-77-1148 Z INTEGRATION TIME 320 SECS ATTN: 70 DB
EXERCISE: BEARING STAKE ANALYSIS BANDWIDTH: 1/10HZ FILTER WTG: HANNING
CENTER FREQ: 270HZ + 74 DEG. AZ STEERING

SECRET

SECRET

270HZ



KOE 10 X 10 TO THE INCH • 7 X 10 INCHES
REQUIR A FOSER CO. MADE IN U.S.A.

46 0703

CONTROL: 1140 - 72 (DP12) DATE OF ANALYSIS: 1-26-58-34 REEL: 1124 INDE X1185
BEAMFORMED SPECTRUM(ELEMENTS) DATE/TIME: 3-10-77 - 1148 Z INTEGRATION TIME 320 SECS ATTN: 10 DB
EXERCISE: BEARING STAKE ANALYSIS BANDWIDTH: 1/10HZ FILTER WTG: HANNING
CENTER FREQ: 270 HZ +76 DEG. AZ STEERING

SECRET

SECRET

2100Z



10 X 10 TO THE INCHES
NEUTRAL & CENTER CO. MADE IN U.S.A.

46 0703

CONTROL: 1140 - 32 (2012) DATE OF ANALYSIS: 1-26-77 - 1140 Z REEL: M24 INDE X1985
BEAMFORMED SPECTRUM (ELEMENTS) DATE/TIME: 3-16-77 - 1140 Z INTEGRATION TIME 320 SECS ATTEN: -16 DB
EXERCISE: BEARING STAKE ANALYSIS BANDWIDTH: 1/10HZ FILTER WTC: HANNING
CENTER FREQ: 270 HZ 70 DEC. AZ STEERING

SECRET

SECRET

270 HZ



CONFIDENTIAL

SIGNAL LEVEL AND SNR

CALCULATIONS

DATA POINT 12

FREQUENCY 140 HZ

NUMBER OF ELEMENTS 51

SIGNAL LEVEL

MCPS-32 SIGNAL LEVEL INDICATED -23.6 dBV

MCPS-32 CAL. CORRECTION +10 -13.6

BEAMFORMER GAIN +24 +10.4 SIG. LEVEL FOR SNR CALCULATION

MRA CORRECTION + .2 +10.6 SIG. LEVEL FOR SIGNAL GAIN

NOISE LEVEL

MCPS-32 SIGNAL LEVEL INDICATED -53.6 dBV

MCPS-32 CAL. CORRECTION +10 -43.6

BEAMFORMER GAIN +24 -19.6 NOISE LEVEL FOR SNR CALCULATION
TI

SIGNAL-NOISE-RATIO

SIGNAL LEVEL FOR SNR +10.4

NOISE LEVEL FOR SNR -19.6 30.0

PROCESSOR CORRECTION -4 26.0

MRA CORRECTION + .2 26.2 SNR .013 HZ BAND

BANDWIDTH CONVERSION _____ SNR 1 HZ BAND

CONFIDENTIAL

CONFIDENTIAL

SIGNAL LEVEL AND SNR

CALCULATIONS

DATA POINT 12

FREQUENCY 290 HZ

NUMBER OF ELEMENTS 51

SIGNAL LEVEL

MCPS-32 SIGNAL LEVEL INDICATED -39.2 dBV

MCPS-32 CAL. CORRECTION +10 -29.2

BEAMFORMER GAIN +24 -5.2 SIG. LEVEL FOR SNR CALCULATION

MRA CORRECTION + .81 -4.4 SIG. LEVEL FOR SIGNAL GAIN

NOISE LEVEL

MCPS-32 SIGNAL LEVEL INDICATED -57.2 dBV

MCPS-32 CAL. CORRECTION +10 -47.2

BEAMFORMER GAIN +24 -23.2 NOISE LEVEL FOR SNR CALCULATION

SIGNAL-NOISE-RATIO

SIGNAL LEVEL FOR SNR -5.2

NOISE LEVEL FOR SNR -23.2 18 0

PROCESSOR CORRECTION -4.2 13.8

MRA CORRECTION + .8 14.6 SNR .013 HZ BAND

BANDWIDTH CONVERSION _____ SNR 1 HZ BAND

CONFIDENTIAL

CONFIDENTIAL

DATA POINT 12SIGNAL GAIN

	<u>140 HZ</u>	<u>290HZ</u>	<u>295HZ</u>
MEAN OMNI SIGNAL LEVEL	<u>-24.8</u>	<u>-38.6</u>	<u> </u>
MRA SIGNAL LEVEL	<u>+10.6</u>	<u>-4.4</u>	<u> </u>
ARRAY SIGNAL GAIN	<u>354</u>	<u>34.2</u>	<u> </u>
20 LOG <u>51</u>	<u>34.1</u>	<u>34.1</u>	<u> </u>
# of elements			
DIFFERENCE	<u>+1.3</u>	<u>+ .1</u>	<u> </u>

ARRAY GAIN

MRA SNR	<u>26.2</u>	<u>14.6</u>	<u> </u>
MEAN OMNI SNR	<u>19.4</u>	<u>7.9</u>	<u> </u>
ARRAY GAIN	<u>6.8</u>	<u>6.7</u>	<u> </u>
THEORETICAL AZMUTH GAIN (at MRA)	<u>12.6</u>	<u>15.1</u>	<u> </u>
DIFFERENCE	<u>-5.8</u>	<u>-8.4</u>	<u> </u>

CONFIDENTIAL

10.5.10 TO THE INCHES 10.5.10 PM 10.5
REMARKS A 10.5.10 PM 10.5

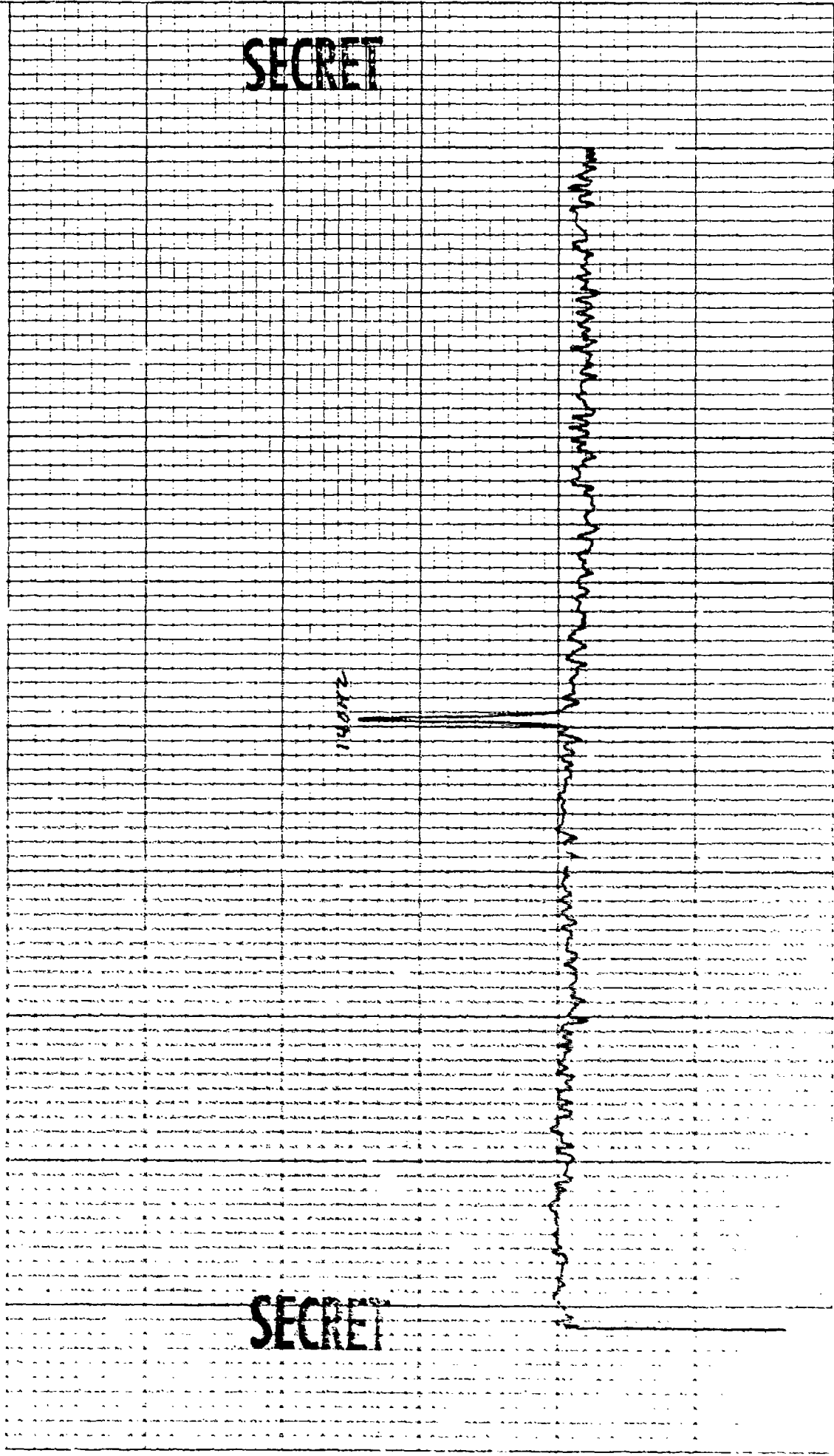
46 0703

CONTROL: 1146 - 51 (2012) REEL: 1134 INDE X 1205
BEAMFORMED SPECTRUM (ELEMENTS) 1-26 1-28-53
EXERCISE: BEARING STAKE DATE/TIME: 3-10-77 - 1148 Z
CENTER FREQ: 140 HZ ANALYSIS BANDWIDTH: 1/10 HZ
51 ELEMENTS 440 DEG. AZ STEERING

INTEGRATION TIME 320 SECS
ATTN: -24 DB
FILTER WTG: HANNING

SECRET

SECRET



CONTROL: 1140 - 51 (0812) DATE OF ANALYSIS: 1-26-53 REEL: 124 INDE X/225
 BEAMFORMED SPECTRUM (ELEMENTS) DATE/TIME: 7-16-77 - 1108 Z INTEGRATION TIME 320 SECS ATTEN: -21 DB
 EXERCISE: BEAKING STAKE ANALYSIS BANDWIDTH: 1/10HZ FILTER WTG: HANNING
 CENTER FREQ: 140 HZ
 51 ELEMENTS +50 DEG. AZ STEERING

SECRET

SECRET

140 HZ



46 0703

CONTROL: 1148 - 51 (QPI2) DATE OF ANALYSIS: 1-26-53 REEL: 424 INDE X/886
BEAMFORMED SPECTRUM (ELEMENTS) DATE/TIME: 3-16-77 - 1148 Z INTEGRATION TIME 320 SECS ATTEN: -24 DB
EXERCISE: BEARING STAKE ANALYSIS BANDWIDTH: 1/10 HZ FILTER WTG: HANNING
CENTER FREQ: 146 HZ
51 ELEMENTS 452 DEG. AZ STEERING

SECRET

SECRET

146 HZ



K-2 10 X 10 TO THE INCH • 7 X 10 INCHES
KEUFFEL & ESSER CO. MADE IN U.S.A.

46 0703

CONTROL: 1140 - 51 (2P12)
BEAMFORMED SPECTRUM (ELEMENTS
EXERCISE: BEARING STAKE
CENTER FREQ: 140 HZ
51 ELEMENTS

DATE OF ANALYSIS: 1-26-77
DATE/TIME: 3-16-77 - 1140 Z
ANALYSIS BANDWIDTH: 1/10 HZ
+ 54 DEG. AZ STEERING

REEL: M24
INTEGRATION TIME 320 SECS
ATTN: -24DB
WTG: HANNING

INDE X/995

SECRET

SECRET

140 HZ

Handwritten notes on the right side of the grid, including a vertical line and some illegible text.

CONTROL: 1148 - 51 (0012)
BEAMFORMED SPECTRUM (ELEMENTS)
EXERCISE: BEARING STAKE
CENTER FREQ: 140 HZ
51 ELEMENTS

DATE OF ANALYSIS: 1-26-77
DATE/TIME: 3-6-77 - 1140 Z
ANALYSIS BANDWIDTH: 1/10 HZ
4-56 DEG. AZ STEERING

REEL: M24
INTEGRATION TIME 320 SECS
FILTER
WTG: HANNING

INDE X1995

ATTN: -24 DB
WTG: HANNING

SECRET

SECRET

1148Z

Handwritten scribbles and markings across the grid.

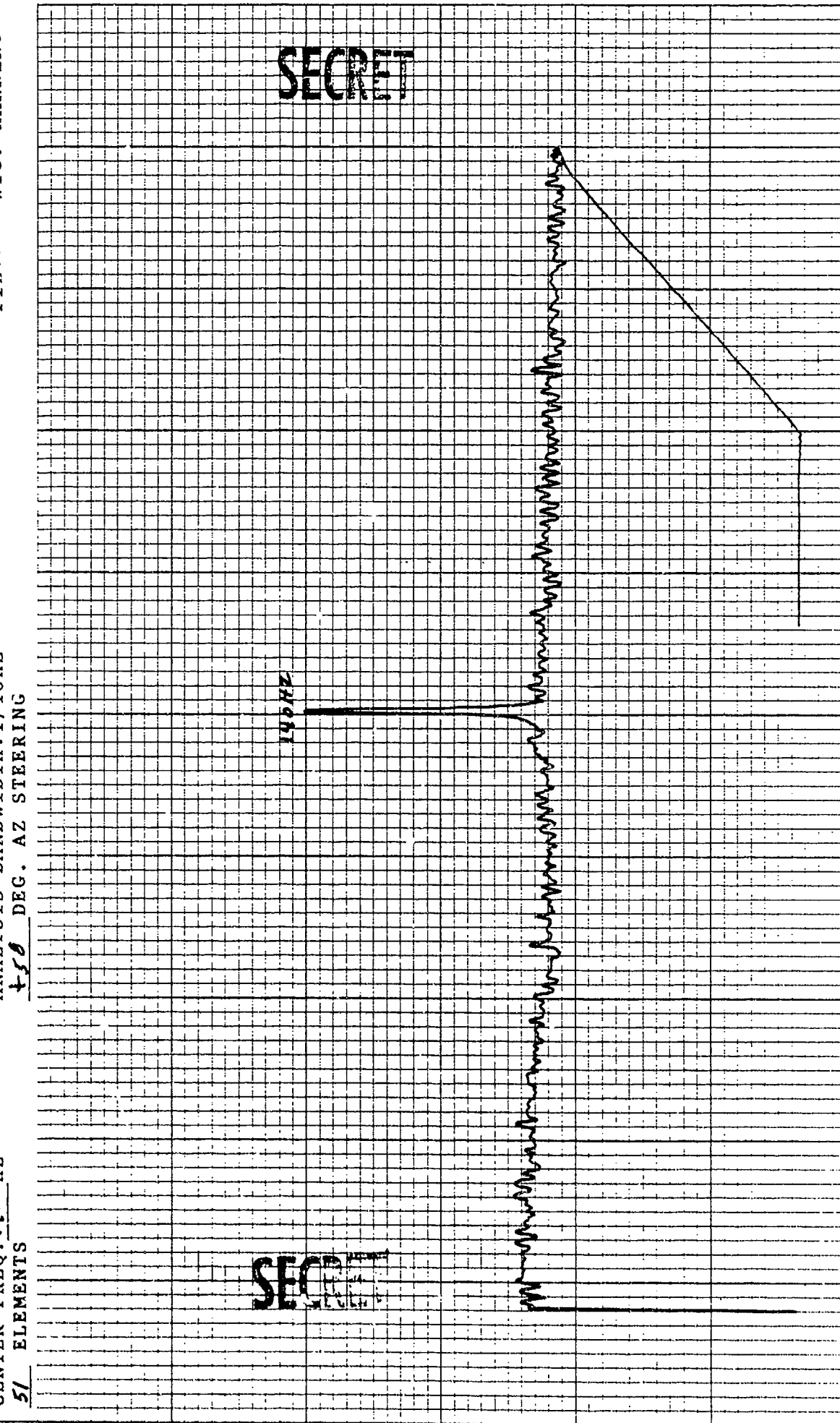
CONTROL: 1149 - 51 (D012)
BEAMFORMED SPECTRUM(ELEMENTS)
EXERCISE: BEARING STAKE
CENTER FREQ: 190 HZ
51 ELEMENTS

DATE OF ANALYSIS: 1-26-87
DATE/TIME: 3-16-87-1140 Z
ANALYSIS BANDWIDTH: 1/10HZ
+50 DEG. AZ STEERING

REEL: 1124
INTEGRATION TIME 320 SECS
FILTER WTG: HANNING

INDE X 1985

ATTEN: -24 DB



CONTROL: 1148 - 51 (2012)
BEAMFORMED SPECTRUM (ELEMENTS)
EXERCISE: BEARING STAKE
CENTER FREQ: 140 HZ
51 ELEMENTS

DATE OF ANALYSIS: 1-26-88-53
DATE/TIME: 3-26-77 - 1148 Z
ANALYSIS BANDWIDTH: 1/10 HZ
+57.5 DEG. AZ STEERING

REEL: M24
INTEGRATION TIME 320 SECS
FILTER
ATTEN: -24 DB
WTG: HANNING

INDE X1995

SECRET

24031

SECRET

Handwritten notes and a large scribble across the bottom of the page.

R. B. 12

CONTROL: 1140 - 51 (2012) DATE OF ANALYSIS: 1-26-53 REEL: H24 INDE X/1885
BEAMFORMED SPECTRUM (ELEMENTS) 1-26-53 INTEGRATION TIME 320 SECS ATTEN: -24DB
EXERCISE: BEARING STAKE ANALYSIS BANDWIDTH: 1/10HZ FILTER WTG: HANNING
CENTER FREQ: 140 HZ
51 ELEMENTS

SECRET

140 HZ

SECRET



46 0703

KOE 10 X 10 TO THE INCHES
REDFIELD & SONS CO. MADE IN U.S.A.

REEL: A24 INDE X 1995
ATTEN: 24 DB
WTC: HANNING

INTEGRATION TIME 320 SECS
FILTER

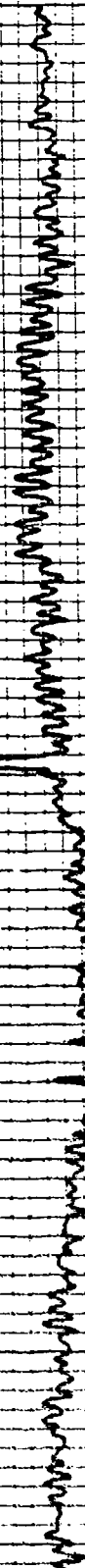
DATE OF ANALYSIS: 1-26-53
DATE/TIME: 376-77-1148 Z
ANALYSIS BANDWIDTH: 1/10HZ
+51 DEG. AZ STEERING

CONTROL: 1148 - 51 (D012)
BEAMFORMED SPECTRUM(ELEMENTS)
EXERCISE: BEARING STAKE
CENTER FREQ: 140 HZ
51 ELEMENTS

SECRET

SECRET

140 HZ



CONTROL: 1148 - 51 (DP12) DATE OF ANALYSIS: 1-26-53 REEL: N24 INDE X/885
BEAMFORMED SPECTRUM (ELEMENTS) DATE/TIME: 3-16-77 - 1148 Z INTEGRATION TIME 320 SECS ATTEN: 24 DB
EXERCISE: BEARING STAKE ANALYSIS BANDWIDTH: 1/10HZ FILTER WTG: HANNING
CENTER FREQ: 140 HZ
51 ELEMENTS + 62 DEG. AZ STEERING

SECRET

140 HZ

SECRET

Handwritten notes and markings on the grid, including a large 'X' and various scribbles.

CONTROL: 1148 - 51 (20/2)
BEAMFORMED SPECTRUM (ELEMENTS)
EXERCISE: BEARING STAKE
CENTER FREQ: 140 HZ
61 ELEMENTS

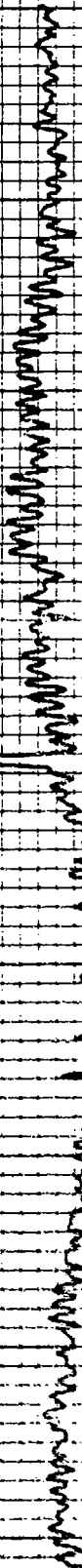
DATE OF ANALYSIS: 1-26-77
DATE/TIME: 3-16-77 - 1148 Z
ANALYSIS BANDWIDTH: 1/10 HZ
+63 DEG. AZ STEERING

REEL: 1144
INTEGRATION TIME 320 SECS
FILTER
WTG: HANNING
INDE X/1005
ATTEN: 04 DB

SECRET

SECRET

1148 Z



CONTROL: 1148 - 21 (2012)
 BEAMFORMED SPECTRUM (ELEMENTS)
 EXERCISE: BEARING STAKE
 CENTER FREQ: 140 HZ
 S1 ELEMENTS

DATE OF ANALYSIS: 1-26-88
 DATE/TIME: 3-26-77 - 1140 Z
 ANALYSIS BANDWIDTH: 1/10 HZ
 +60 DEG. AZ STEERING

REEL: A24
 INTEGRATION TIME 320 SECS
 FILTER

INDE X/1995
 ATTN: -24 DB
 WTC: HANNING

SECRET

SECRET

140 HZ

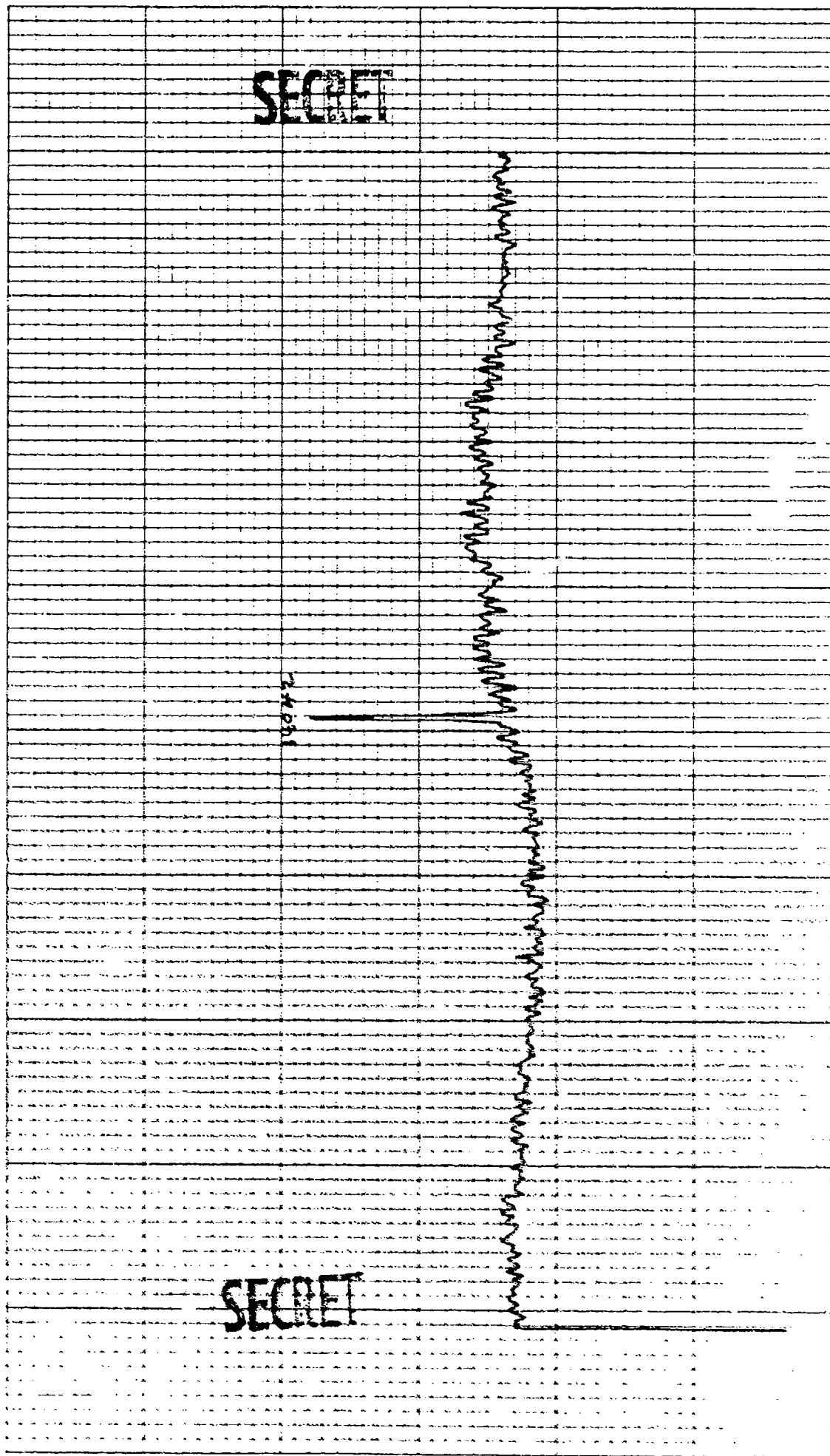


46 0703

4.23

SECRET

SECRET



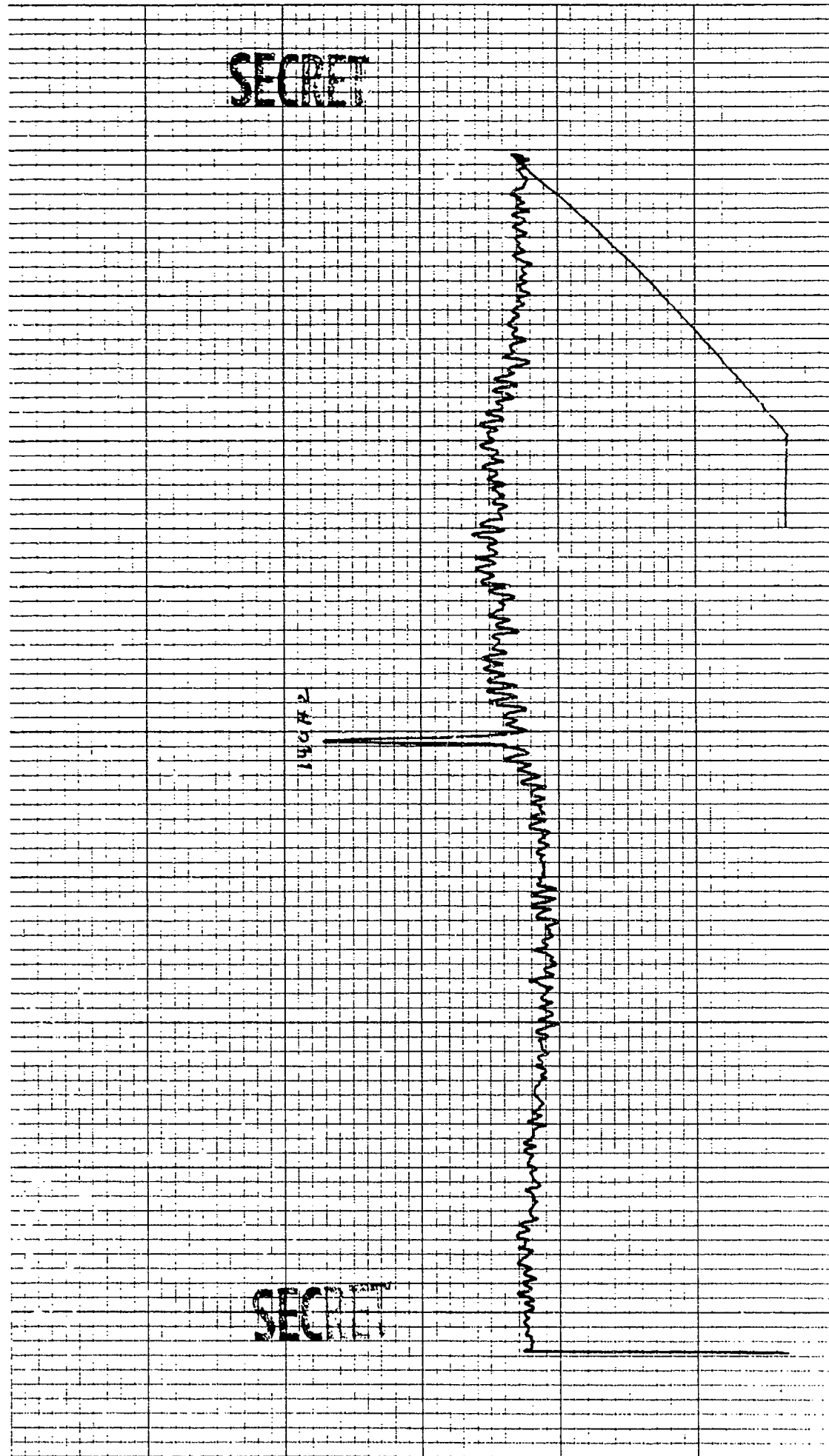
KSE 10 X 12 TO THE INCH • 7 X 10 INCHES
HEIL FELL & ESSER CO. MADE IN U.S.A.

46 0703

CONTROL: 1140 - 57 (8012)
BEAMFORMED SPECTRUM (ELEMENTS)
EXERCISE: BEARING STAKE
CENTER FREQ: 140 HC
57 ELEMENTS

DATE OF ANALYSIS: 1-26-68
DATE/TIME: 3-26-77 - 1140 Z
ANALYSIS BANDWIDTH: 1/10HZ
+18 DEG. AZ STEERING

REEL: 1144
INDE X/1205
INTEGRATION TIME 320 SECS
ATTEN: -2V DB
FILTER WTG: HANNING



K-E 10 X 10 TO THE INCH • 7 X 10 INCHES
KEUFFEL & ESSER CO. MADE IN U.S.A.

46 0703

CONTROL: 1148 -51 (0012)
BEAMFORMED SPECTRUM (ELEMENTS)
EXERCISE: BEARING STAKE
CENTER FREQ: 140 HZ
51 ELEMENTS

DATE OF ANALYSIS: 1-26-53
DATE/TIME: 3-16-77 -1148 Z
ANALYSIS BANDWIDTH: 1/10HZ
170 DEG. AZ STEERING

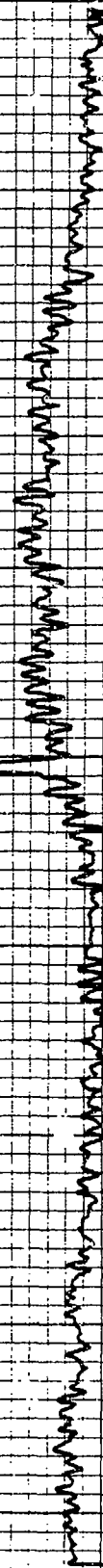
REEL: 424
INTEGRATION TIME 320 SECS
FILTER

INDE X 1985
ATTEN: -2V DB
WTG: HANNING

SECRET

SECRET

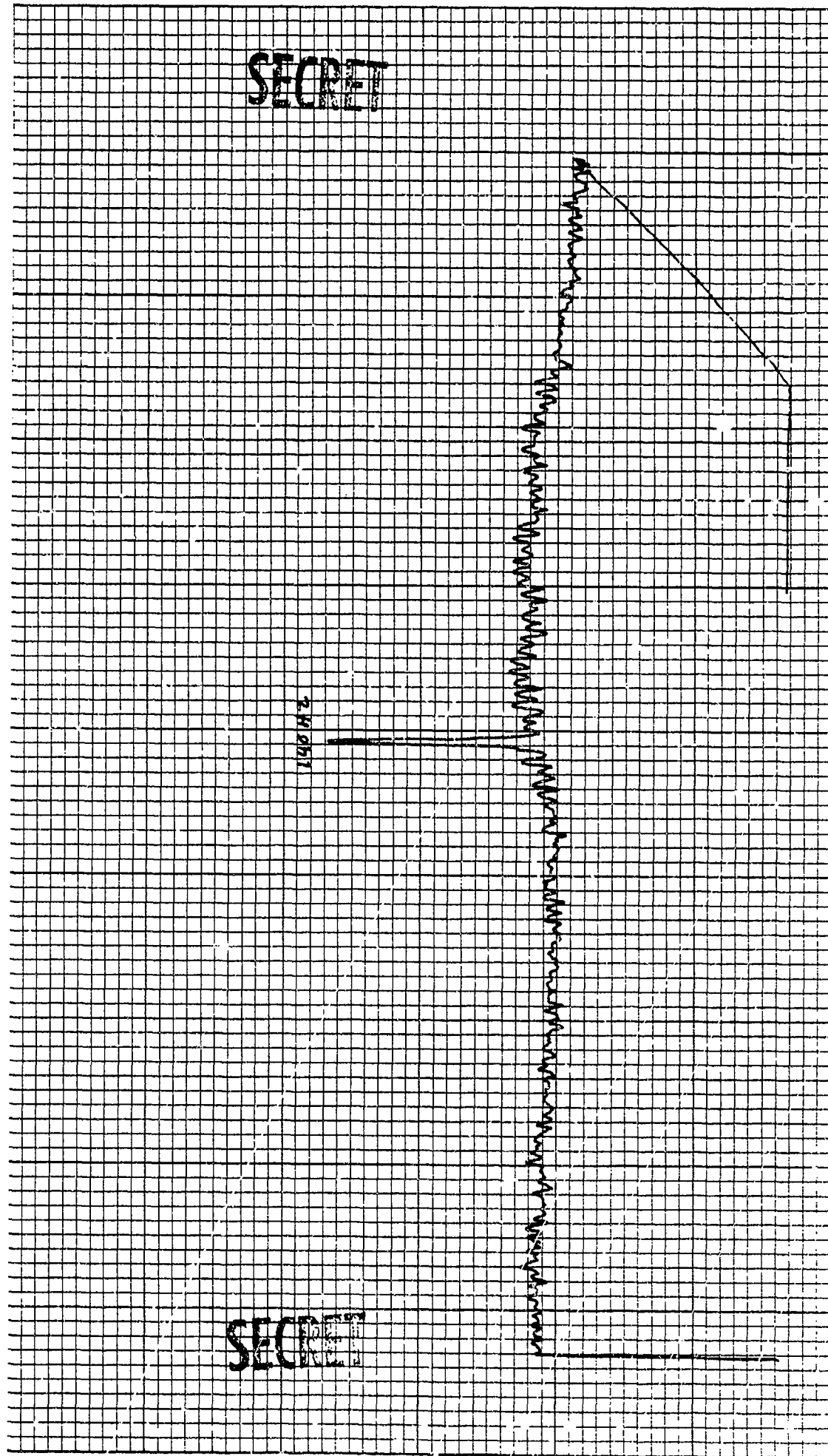
140HZ



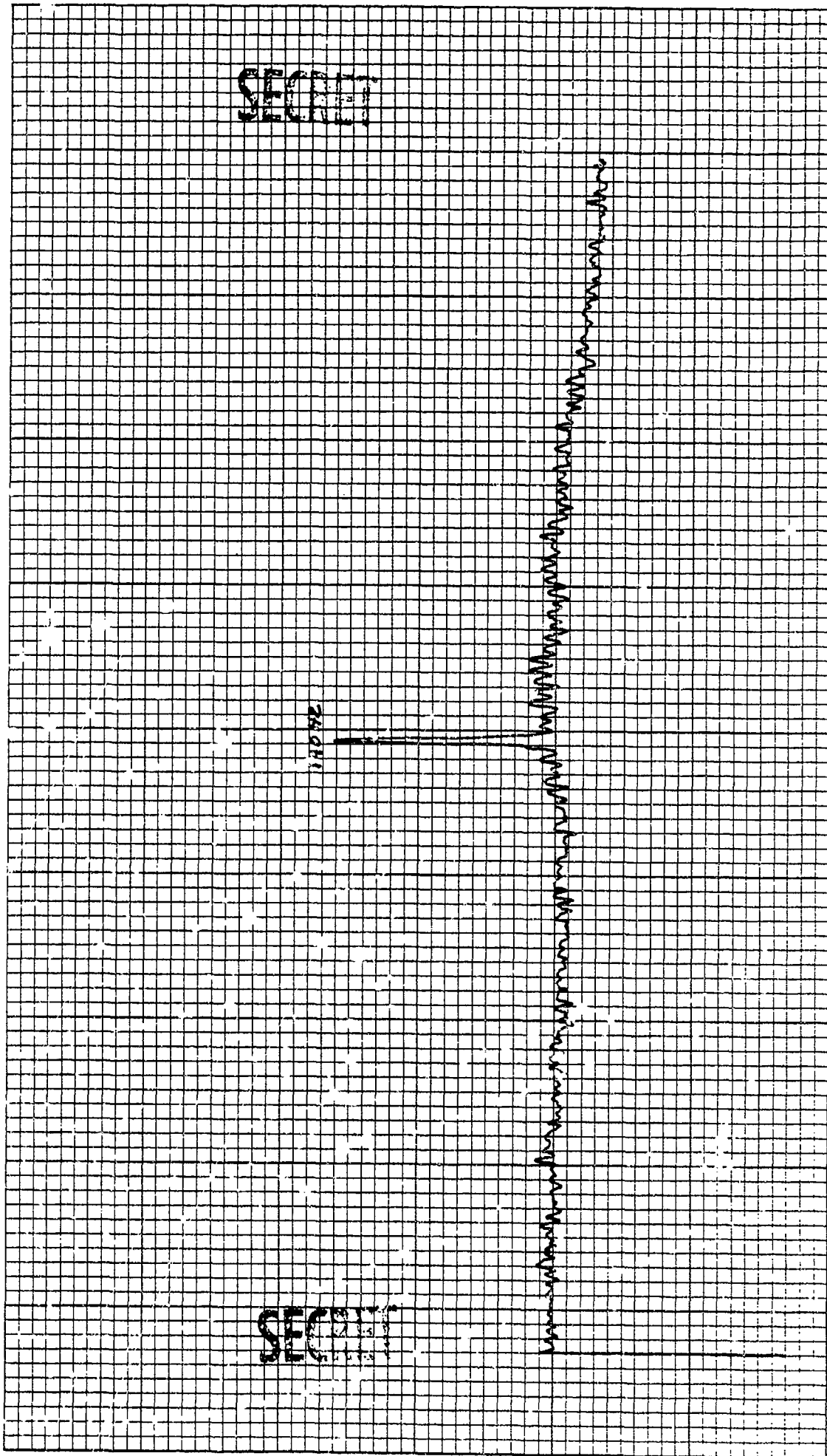
K-E 10 X 10 TO THE INCH • 7 X 10 INCHES
KEUFFEL & ESSER CO. MADE IN U.S.A.

46 0703

CONTROL: 1140 - 51 (DP12) DATE OF ANALYSIS: 1-26-88-53 REEL: K24 INDE X1005
BEAMFORMED SPECTRUM (ELEMENTS) DATE/TIME: 3-12-77 - 1140 Z INTEGRATION TIME 320 SECS ATTN: -24 DB
EXERCISE: BEARING STAKE ANALYSIS BANDWIDTH: 1/10 HZ FILTER WTG: HANNING
CENTER FREQ: 140 HZ
51 ELEMENTS +72 DEG. AZ STEERING



CONTROL: 1148 - 51 (DP12) DATE OF ANALYSIS: 1-26-53 REEL: N84 INDE X1915
BEAMFORMED SPECTRUM (ELEMENTS) DATE/TIME: 3-4-77 - 1146 Z INTEGRATION TIME 320 SECS ATTN: -24 DB
EXERCISE: BEAKING STAKE ANALYSIS BANDWIDTH: 1/10 HZ FILTER WTC: HANNING
CENTER FREQ: 148 HZ
51 ELEMENTS DEG. AZ STEERING



10 X 10 TO THE INCH • 7 X 10 INCHES
KEUFFEL & ESSER CO. MADE IN U.S.A.

46 0703

CONTROL: 1148 - 5/ (DPIA) DATE OF ANALYSIS: 1-26-53 REEL: 124 INDE X 1985
BEAMFORMED SPECTRUM (ELEMENTS) DATE/TIME: 3-16-77 - 1/148 Z INTEGRATION TIME 320 SECS ATTEN: -24 DB
EXERCISE: BEARING STAKE ANALYSIS BANDWIDTH: 1/10HZ FILTER WTC: HANNING
CENTER FREQ: 140 HZ +76 DEG. AZ STEERING

SECRET

SECRET

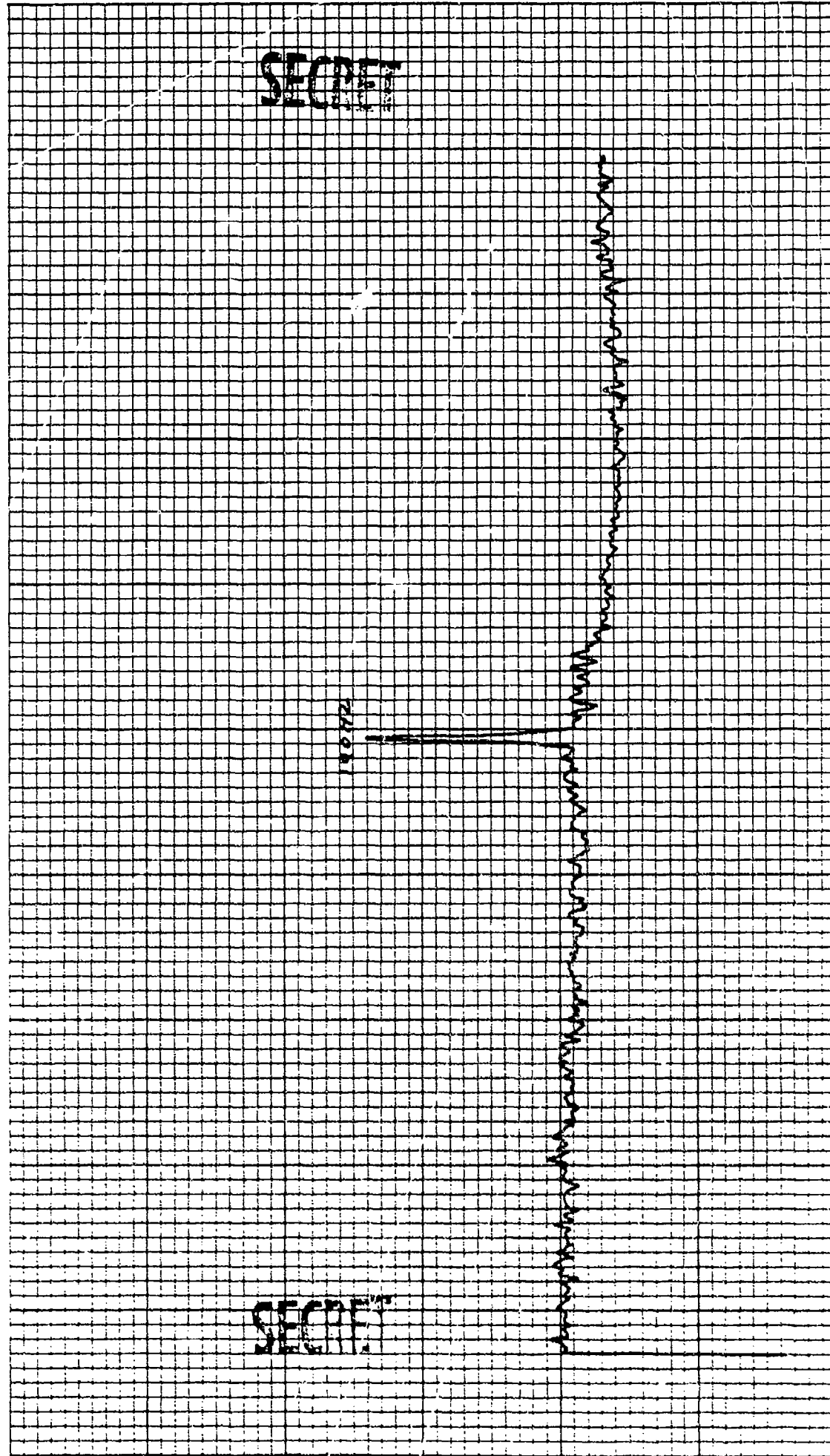
1148 HZ

1148 HZ

K-E 10 X 10 TO THE INCH, 7 X 10 INCHES
KLUFFEL & ESSER CO. MADE IN U.S.A.

46 0703

CONTROL: 1148 - 51 (2012) DATE OF ANALYSIS: 1-26-53 REEL: M-2V INDE X 1195
BEAMFORMED SPECTRUM (ELEMENTS) DATE/TIME: 3-16-77 - 1148 Z INTEGRATION TIME 320 SECS ATTN: -24DB
EXERCISE: BEARING STAKE ANALYSIS BANDWIDTH: 1/10HZ FILTER WTG: HANNING
CENTER FREQ: 14.0 HZ +70 DEG. AZ STEERING



CONTROL: 1140 - 51 (D012) DATE OF ANALYSIS: - - -
BEAMFORMED SPECTRUM (ELEMENTS 1-36 & 28-53)
EXERCISE: BEARING STAKE DATE/TIME: 3-16-77 - 1140 Z
CENTER FREQ: 270 HZ ANALYSIS BANDWIDTH: 1/10 HZ
51 ELEMENTS +40 DEG. AZ STEERING

REEL: 1124 INDE X/986
INTEGRATION TIME 320 SECS ATTN: 24 DB
FILTER WTG: HANNING

SECRET

SECRET

20012

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K-E 10 X 10 TO THE INCH • 7 X 10 INCHES
KEUFFEL & ESSER CO. MADE IN U.S.A.

46 0703

CONTROL: 1148 - 51 (DP12)
BEAMFORMED SPECTRUM (ELEMENTS
EXERCISE: BEARING STAKE
CENTER FREQ: 270 HZ
51 ELEMENTS

DATE OF ANALYSIS: 1-26-77
DATE/TIME: 1148 Z
ANALYSIS BANDWIDTH: 1/10 HZ
+50 DEG. AZ STEERING

REEL: 424
INTEGRATION TIME 320 SECS
FILTER
ATTN: 24 DB
WTG: HANNING

INDE X/REF

SECRET

SECRET

20002

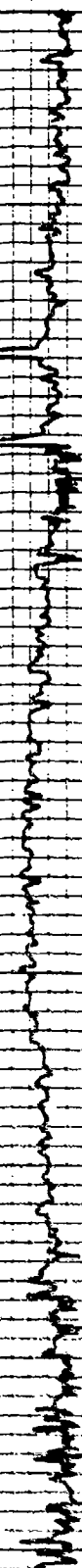


CONTROL: 1146 - 51 (DP12) DATE OF ANALYSIS: 1-26-53 REEL: M24 INDE X1983
BEAMFORMED SPECTRUM (ELEMENTS) 1-26-53
EXERCISE: BEARING STAKE DATE/TIME: 3-6-77 - 1148 Z INTEGRATION TIME 320 SECS ATTEN: -2YDB
CENTER FREQ: 270 HZ ANALYSIS BANDWIDTH: 1/10 HZ FILTER WTG: HANNING
51 ELEMENTS 452 DEG. AZ STEERING

SECRET

SECRET

280 HZ

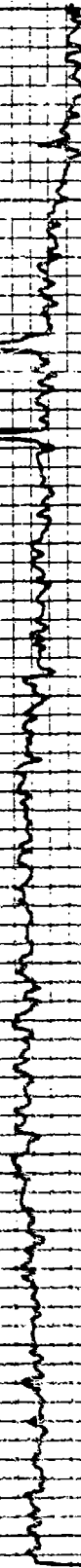


CONTROL: 1140 - 51 (D012) DATE OF ANALYSIS: 1-26-53 REEL: 1124 INDE X1205
 BEAMFORMED SPECTRUM(ELEMENTS) DATE/TIME: 7-16-77 - 1140 Z INTEGRATION TIME 320 SECS ATTEN: -34DB
 EXERCISE: BEARING STAKE ANALYSIS BANDWIDTH: 1/10HZ FILTER WTG: HANNING
 CENTER FREQ: 270 HZ
 51 ELEMENTS +54 DEC. AZ STEERING

SECRET

SECRET

20002



10 X 10 TO THE INCH • 7 X 10 INCHES
NEUFFEL & ESSER CO. MADE IN U.S.A.

46 0703

CONTROL: 1148 - 51 (0012) DATE OF ANALYSIS: 1-26-53 INDE X/1985
BEAMFORMED SPECTRUM(ELEMENTS) 1-26-53
EXERCISE: BEARING STAKE DATE/TIME: 3-16-77 - 1148 Z
CENTER FREQ: 270 HZ ANALYSIS BANDWIDTH: 1/10HZ
51 ELEMENTS +56 DEG. AZ STEERING

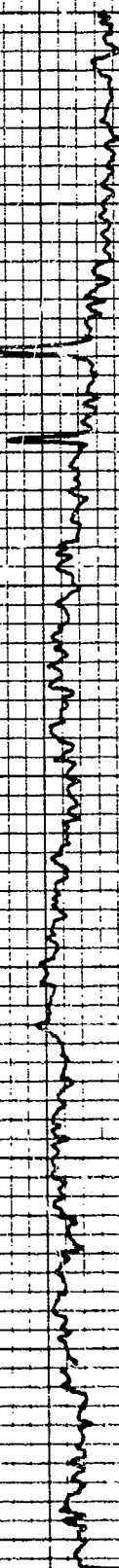
REEL: 144

INTEGRATION TIME 320 SECS
ATTN: -2Y DB
FILTER WTC: HANNING

SECRET

SECRET

20000

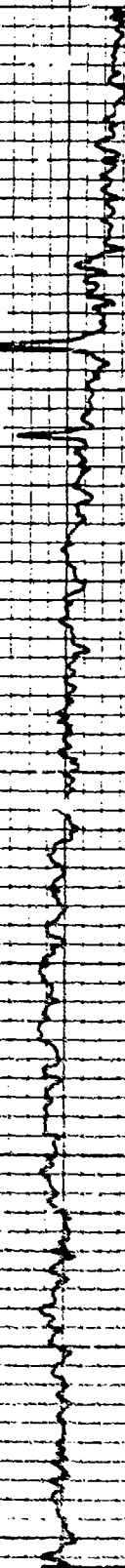


CONTROL: 1140 - 51 (2012) DATE OF ANALYSIS: 1-26-53 REEL: 124 INDE X1985
BEAMFORMED SPECTRUM (ELEMENTS) DATE/TIME: 3-16-77 - 1148Z INTEGRATION TIME 320 SECS ATTN: -24 DB
EXERCISE: BEARING STAKE ANALYSIS BANDWIDTH: 1/10 HZ FILTER WTG: HANNING
CENTER FREQ: 270 HZ
51 ELEMENTS +38 DEG. AZ STEERING

SECRET

SECRET

210 HZ



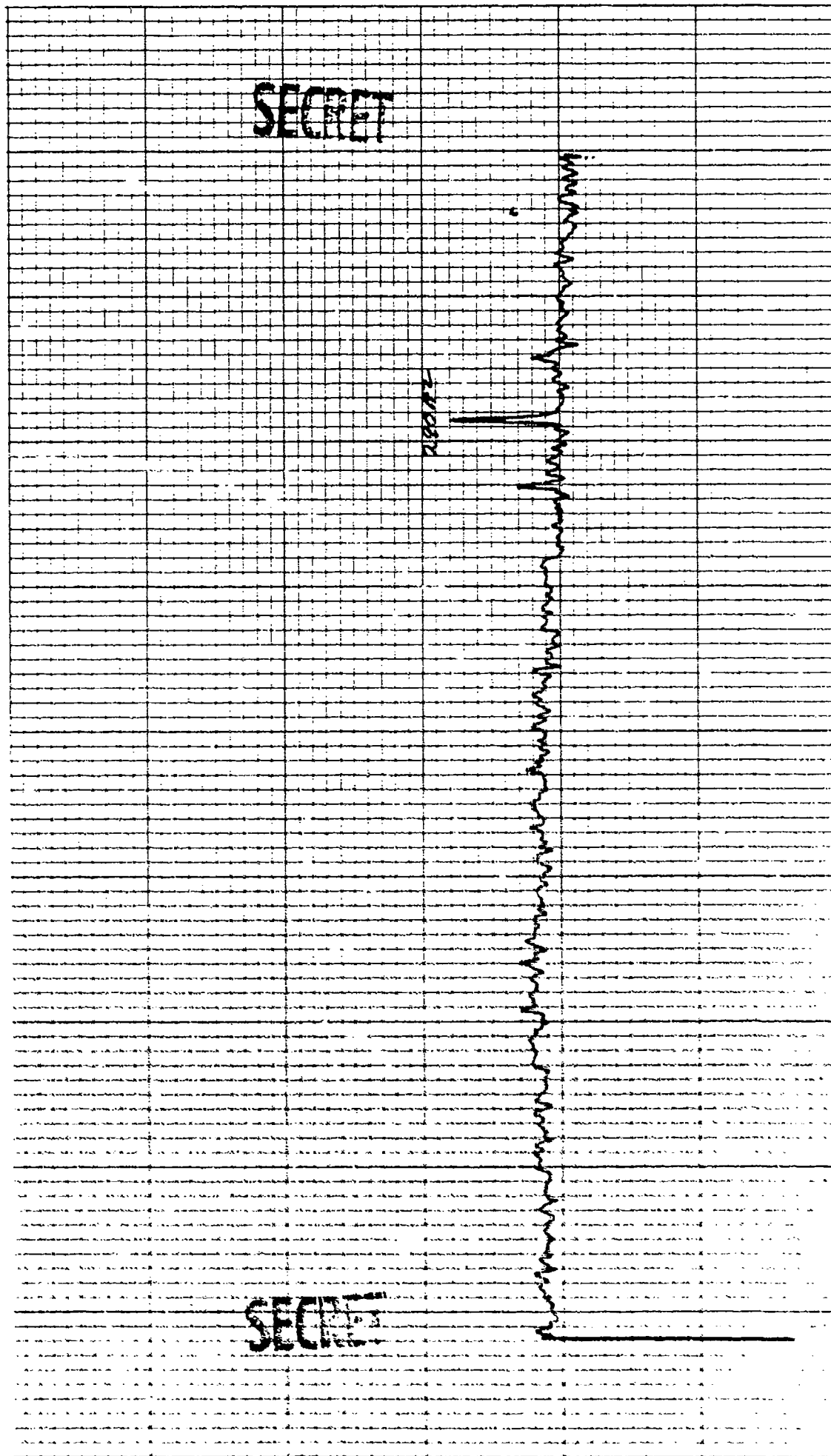
CONTROL: 1140 - 51 (D012)
BEAMFORMED SPECTRUM (ELEMENTS)
EXERCISE: BEARING STAKE
CENTER FREQ: 270 HZ
5(ELEMENTS

DATE OF ANALYSIS: 1-26-53
DATE/TIME: 3-6-77-1148 Z
ANALYSIS BANDWIDTH: 1/10 HZ
+ 59.5 DEG. AZ STEERING

REEL: A24

INDE X1985

INTEGRATION TIME 320 SECS
FILTER
ATTN: -24 DB
WTG: HANNING



46 0703

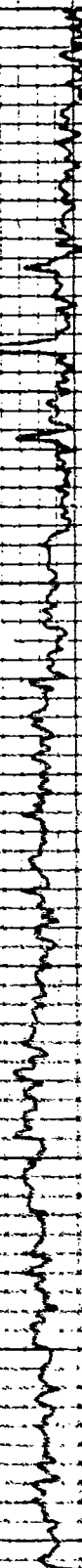
DATE OF ANALYSIS: 1-26-53)
DATE/TIME: 3-16-77 - 1100 Z
ANALYSIS BANDWIDTH: 1/10HZ
+60 DEG. AZ STEERING

REEL: 1424 INDEX: X1005
INTEGRATION TIME 320 SECS ATTEN: -24 DB
FILTFR WTC: HANNING

SECRET

SECRET

2402

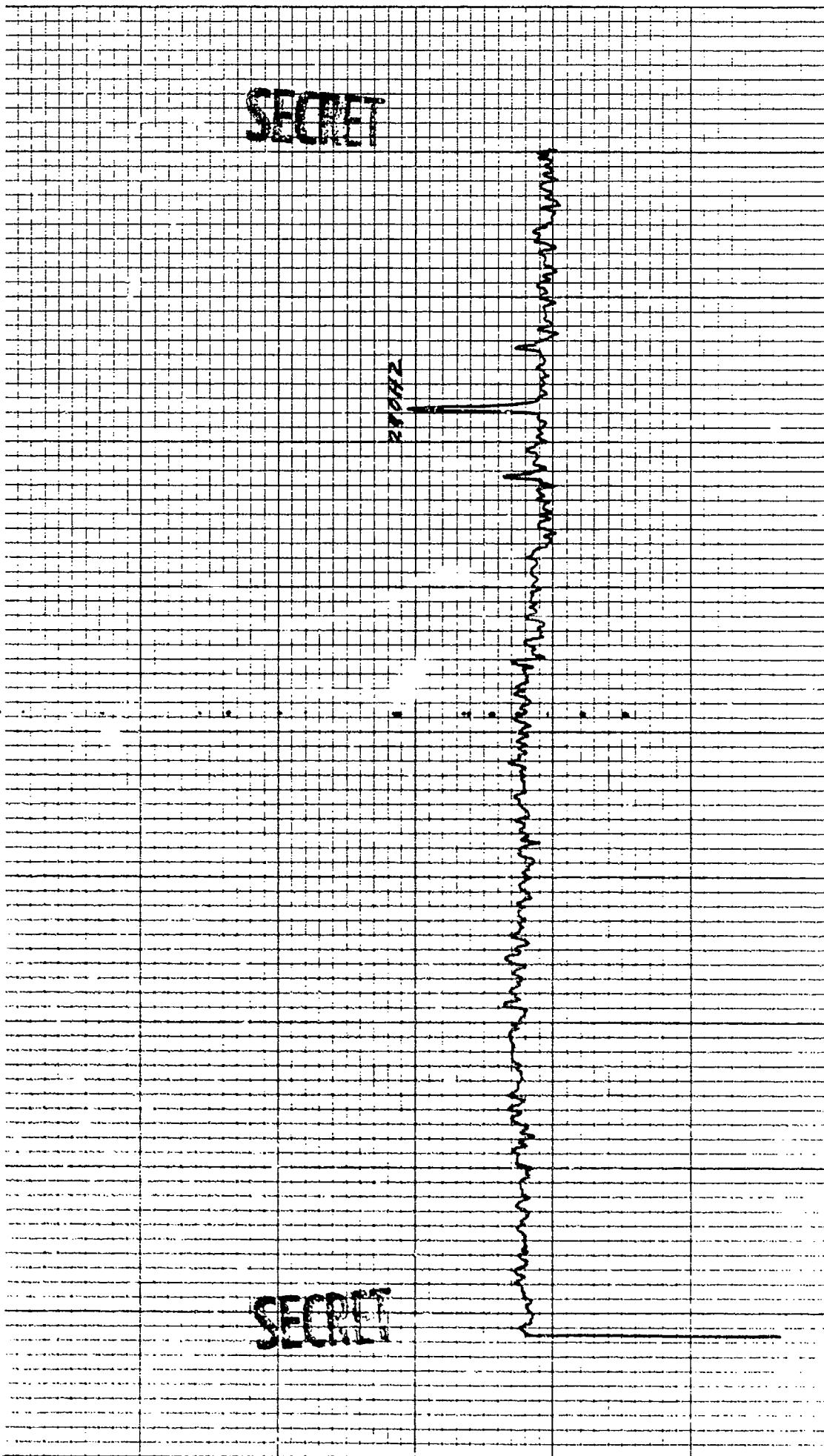


CONTROL: 1140 - 51 (DP12)
 BEAMFORMED SPECTRUM (ELEMENTS)
 EXERCISE: BEARING STAKE
 CENTER FREQ: 270 HZ
 51 ELEMENTS

DATE OF ANALYSIS: 1-26-88-53
 DATE/TIME: 3-16-77-1148 Z
 ANALYSIS BANDWIDTH: 1/10 HZ
 + 51 DEG. AZ STEERING

REEL: N24
 INTEGRATION TIME 320 SECS
 FILTER WTG: HANNING

INDE X/1995



SECRET

SECRET

K-2 10 X 10 TO THE INCH • 7 X 10 INCHES
NEUFEL & ESSER CO. MADE IN U.S.A.

46 0703

CONTROL: 1148 - 51 (DP12)
BEAMFORMED SPECTRUM (ELEMENTS)
EXERCISE: BEARING STAKE
CENTER FREQ: 270 HZ
51 ELEMENTS

DATE OF ANALYSIS: -- -- --
1-26-53
DATE/TIME: 3-16-77 - 1148 Z
ANALYSIS BANDWIDTH: 1/10 HZ
+ 62 DEG. AZ STEERING

REEL: M24

INDE X/995

INTEGRATION TIME 320 SECS
ATTEN: -27 DB
FILTER WTG: HANNING

SECRET

SECRET

280472

Handwritten signature or scribble across the grid.

K&E 10 X 10 TO THE INCH • 7 X 10 INCHES
KEUFFEL & ESSER CO. MADE IN U.S.A.

46 0703

351

CONTROL: 1140 - 51 (DP12) DATE OF ANALYSIS: 1-26-55 REEL: 424 INDE X 1885
BEAMFORMED SPECTRUM (ELEMENTS))
EXERCISE: BEARING STAKE DATE/TIME: 3-16-77 - 1148 Z INTEGRATION TIME 320 SECS ATTN: -24 DB
CENTER FREQ: 270 HZ ANALYSIS BANDWIDTH: 1/10HZ FILTER WTG: HANNING
51 ELEMENTS +63 DEG. AZ STEERING

SECRET

SECRET

29082

Handwritten scribbles and lines across the grid.

K-2 10 X 10 TO THE INCH • 7 X 10 INCHES
KEUFFEL & ESSER CO. MADE IN U.S.A.

46 0703

BS1122

CONTROL: 1140 - 51 (0012)
BEAMFORMED SPECTRUM (ELEMENTS)
EXERCISE: BEARING STAKE
CENTER FREQ: 270 HZ
51 ELEMENTS

DATE OF ANALYSIS: - - -
1-26-88-55
DATE/TIME: 3-16-77 - 1148 Z
ANALYSIS BANDWIDTH: 1/10 HZ
+ 6Y DEG. AZ STEERING

REEL: H24
INTEGRATION TIME 320 SECS
ATTEN: -2Y DB
FILTER WTG: HANNING

INDE X/1995

SECRET

SECRET

280000



K-2 10 X 10 TO THE INCH • 7 X 10 INCHES
KEUFFEL & ESSER CO. MADE IN U.S.A.

46 0703

CONTROL: 1140 - 51 (DP12) DATE OF ANALYSIS: - - - -
BEAMFORMED SPECTRUM (ELEMENTS) 1-26 & 28-53)
EXERCISE: BEARING STAKE DATE/TIME: 3-16-77 - 1140 Z
CENTER FREQ: 270 HZ ANALYSIS BANDWIDTH: 1/10 HZ
51 ELEMENTS 1-66 DEG. AZ STEERING

REEL: 124 INDE X 1995

INTEGRATION TIME 320 SECS
ATTEN: -24 DB
FILTER WTG: HANNING

SECRET

SECRET

28052

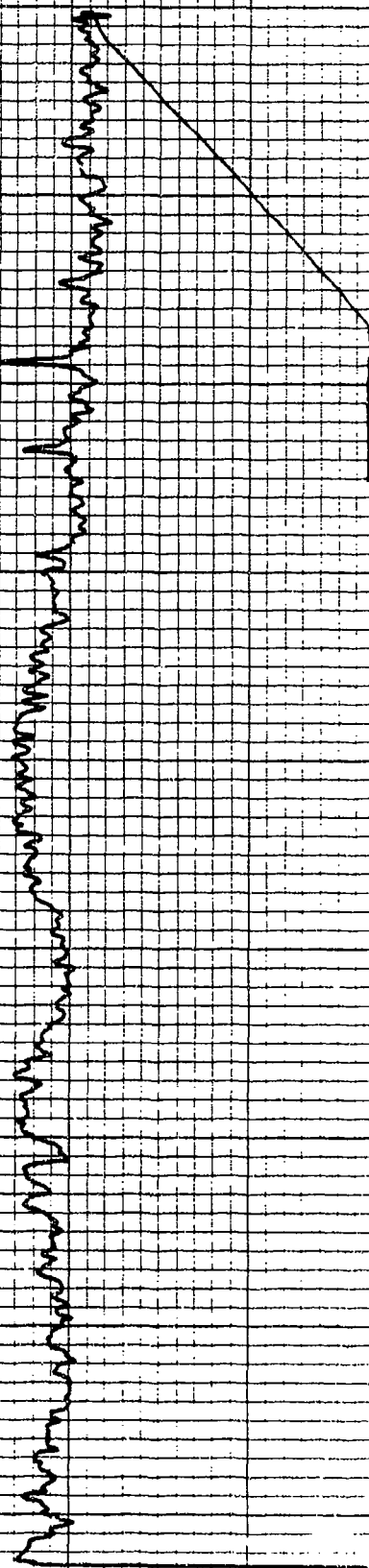
[Handwritten squiggly line across the grid]

CONTROL: 1140 - 51 (DP12) DATE OF ANALYSIS: 1-26-53 INDE X1945
BEAMFORMED SPECTRUM(ELEMENTS) DATE/TIME: 3-16-77 - 1140 Z INTEGRATION TIME 320 SECS REEL: K24
EXERCISE: BEARING STAKE ANALYSIS BANDWIDTH: 1/10HZ ATTN: -24 DB
CENTER FREQ: 270 HZ + 68 DEG. AZ STEERING FILTER WTG: HANNING
51 ELEMENTS

SECRET

SECRET

280 HZ



KOE 10 X 10 TO THE INCH • 7 X 10 INCHES
KEUFFEL & ESSER CO. MADE IN U.S.A.

46 0703

7.51123

CONTROL: 1148 - 51 (DP12)
BEAMFORMED SPECTRUM (ELEMENTS)
EXERCISE: BEARING STAKE
CENTER FREQ: 270 HZ
51 ELEMENTS

DATE OF ANALYSIS: - - -
1-26-88-53)
DATE/TIME: 3-16-77 - 1148 Z
ANALYSIS BANDWIDTH: 1/10 HZ
+ 70 DEG. AZ STEERING

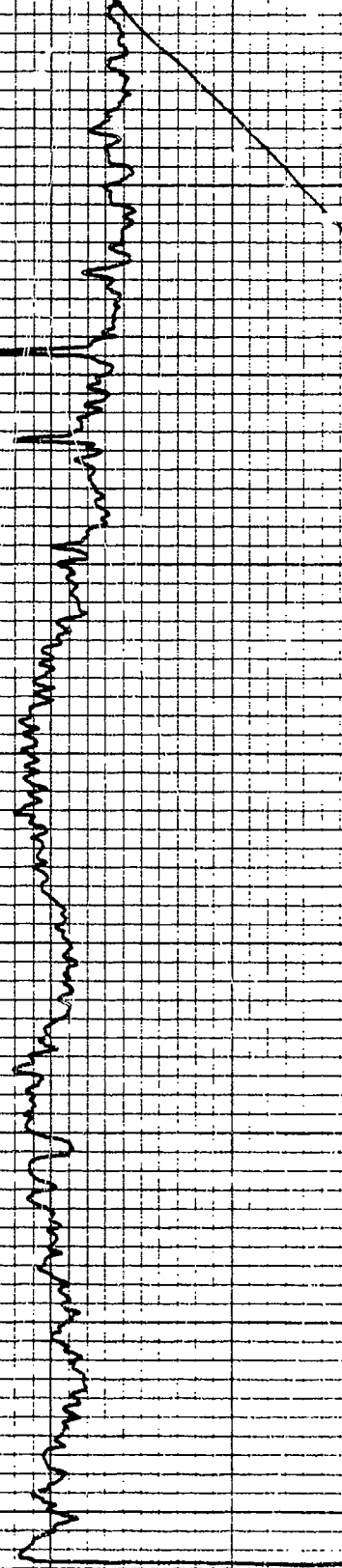
REEL: M24
INTEGRATION TIME 320 SECS
FILTER
ATTN: -34 DB
WTG: HANNING

INDE X1885

SECRET

SECRET

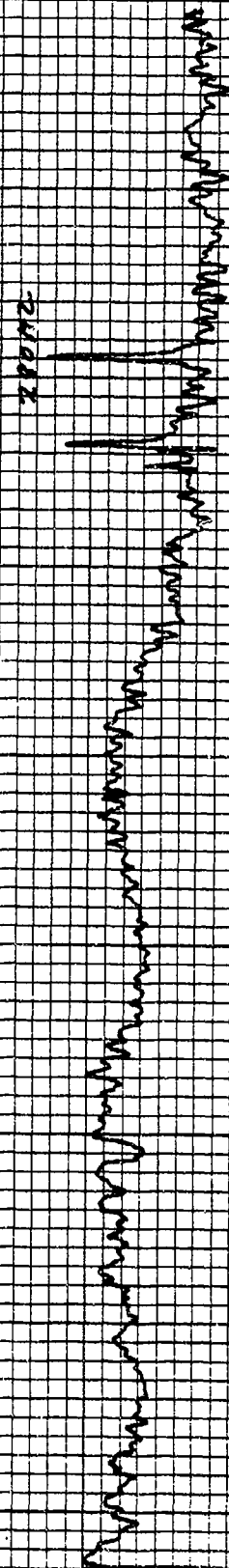
220 HZ



CONTROL: 1140 - 51 (DP12) DATE OF ANALYSIS: 1-26-29-53 REEL: 424 INDE X1000
BEAMFORMED SPECTRUM (ELEMENTS) DATE/TIME: 3-16-77 - 1140 Z INTEGRATION TIME 320 SECS ATTN: -24 DB
EXERCISE: BEARING STAKE ANALYSIS BANDWIDTH: 1/10HZ FILTER WTG: HANNING
CENTER FREQ: 270 HZ
51 ELEMENTS

SECRET

SECRET



KOE 10 X 10 TO THE INCH • 7 X 10 INCHES
KEUFFEL & ESSER CO. MADE IN U.S.A.

46 0703

CONTROL: 1140 - 51 (D012) DATE OF ANALYSIS: 1-26-53 REEL: 1124 INDE X 1995
BEAMFORMED SPECTRUM (ELEMENTS) DATE/TIME: 376-77 - 1148Z INTEGRATION TIME 320 SECS ATTEN: -24DB
EXERCISE: BEARING STAKE ANALYSIS BANDWIDTH: 1/10HZ FILTER WTG: HANNING
CENTER FREQ: 270 HZ
51 ELEMENTS + 74 DEG. AZ STEERING

SECRET

SECRET

SECRET

Handwritten scribbles and markings on the grid, including a vertical line and various wavy lines.

K-E 10 X 10 TO THE INCH = 7 X 10 INCHES
KEUFFEL & ESSER CO. MADE IN U.S.A.

46 0703

CONTROL: 1148 - 5' (2012)
BEAMFORMED SPECTRUM(ELEMENTS 1-264 22-53)
EXERCISE: BEARING STAKE
CENTER FREQ: 270 HZ
5' ELEMENTS

DATE OF ANALYSIS: -- -- --
DATE/TIME: 3-16-77 - 1148 Z
ANALYSIS BANDWIDTH: 1/10HZ
+78 DEG. AZ STEERING

REEL: K24
INTEGRATION TIME 320 SECS
FILTER WTG: HANNING

INDE X 1985
ATTEN: -34 DB

SECRET

SECRET

SECRET



DEPARTMENT OF THE NAVY

OFFICE OF NAVAL RESEARCH
875 NORTH RANDOLPH STREET
SUITE 1425
ARLINGTON VA 22203-1995

IN REPLY REFER TO:

5510/1
Ser 321OA/011/06
31 Jan 06

MEMORANDUM FOR DISTRIBUTION LIST

Subj: DECLASSIFICATION OF LONG RANGE ACOUSTIC PROPAGATION PROJECT
(LRAPP) DOCUMENTS

Ref: (a) SECNAVINST 5510.36

Encl: (1) List of DECLASSIFIED LRAPP Documents

1. In accordance with reference (a), a declassification review has been conducted on a number of classified LRAPP documents.
2. The LRAPP documents listed in enclosure (1) have been downgraded to UNCLASSIFIED and have been approved for public release. These documents should be remarked as follows:

Classification changed to UNCLASSIFIED by authority of the Chief of Naval Operations (N772) letter N772A/6U875630, 20 January 2006.

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3. Questions may be directed to the undersigned on (703) 696-4619, DSN 426-4619.

A handwritten signature in black ink, appearing to read "B. F. Link", is positioned above the typed name.

BRIAN LINK
By direction

Subj: DECLASSIFICATION OF LONG RANGE ACOUSTIC PROPAGATION PROJECT
(LRAPP) DOCUMENTS

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Report Number	Personal Author	Title	Publication Source (Originator)	Pub. Date	Current Availability	Class.
Unavailable	Unavailable	SELF-TENSIONING ACOUSTICAL HORIZONTAL LINE ARRAY (SPRAY) DATA ANALYSIS. FINAL REPORT OF BEARING STAKE TESTS JANUARY THRU MARCH 1977. VOLUME IVB. DATA POINTS 10, 11 AND 12 RAW DATA ANALYSIS OF ACOUSTIC BOTTOM INTERACTION IN BEARING STAKE (U)	Sanders Associates, Inc.	790109	ADC017579	U
ARLTR7924	Mitchell, S. K., et al.	REPORT FOR CHURCH STROKE II OCEANOGRAPHIC SERVICES	University of Texas, Applied Research Laboratories	790223	ADE001369; NS; ND	U
TIU1886502F	Eichenberger, D.	FINAL REPORT, 1 NOVEMBER 1976-31 DECEMBER 1978	Texas Instruments, Inc.	790326	ADB036751; ND	U
Unavailable	Unavailable	PREMOBILIZATION OF R/V INDIAN SEAL	Xonics, Inc.	790430	ADB037987	U
Unavailable	Mitchell, T. M.	ACODAC AMBIENT NOISE PROGRAM	Texas Instruments, Inc.	790531	ADB039703	U
Unavailable	Hays, E. E.	INTRODUCTION TO THE LRAPP ENVIRONMENTAL-ACOUSTIC DATA BANK (U)	Woods Hole Oceanographic Institution	790601	ADB040404	U
LRAPPR79029	Unavailable	MEASUREMENTS ON AQUADYNE MODEL AQ-1 ELEMENTS FOR THE UPGRADED LAMBDA ARRAY	Naval Ocean R&D Activity	790601	ADB041066; NS	U
USRD NO. 4807	Unavailable	SUMMARY OF ENVIRONMENTAL ACOUSTIC DATA ANALYSIS	Naval Research Laboratory	790802	ND	U
Unavailable	Ellis, G. E.	TAP III FINAL REPORT (U)	University of Texas, Applied Research Laboratories	790814	ADA073876	U
BR U0048-9C2	Unavailable	OPTIONS, REQUIREMENTS, AND RECOMMENDATIONS FOR AN LRAPP ACOUSTIC ARRAY PERFORMANCE MODEL (U)	Bunker-Ramo Corp. Electronic Systems Division	790901	ND	U
ORITR1245	Moses, E. J.	EVALUATION OF STANDARD OCEAN CANDIDATES ENVIRONMENTAL ACOUSTIC SUPPORT FOR FLEET OPERATIONS AND NATO	ORI, Inc.	790917	NS; ND	U
Unavailable	Colborn, J. G., et al.	SUMMARY OF ENVIRONMENTAL ACOUSTIC MEASUREMENTS, MODELING AND ANALYSIS	Pacific-Sierra Research Corp.	800301	ADA087304	U
Unavailable	Kirby, W. D.	SURFACE DUCT, ROUGH SURFACE SCATTERING, AND CUSPED CAUSTIC IMPROVEMENTS FOR FACT	Science Applications, Inc.	801112	ADB052623	U
Unavailable	Unavailable	WIND-GENERATED NOISE MODELING	University of Texas, Applied Research Laboratories	801215	ADB053770	U
Unavailable	Renner, W. W., et al.	TOWED ARRAY PERFORMANCE PREDICTION SYSTEM - VERSION 1.2	Science Applications, Inc.	810301	ADA126250	U
Unavailable	Wilson, J. H.	FINAL REPORT	Science Applications, Inc.	810401	ADA190143	U
Unavailable	Goit, E. H.		Science Applications, Inc.	810701	ADB059397	U
3	Unavailable		University of Texas, Applied Research Laboratories	810721	ND	U